Gas Journal

VOL. 291. 103rd YEAR. LONDON, SEPTEMBER 18, 1957 No. 4814 PRICE 1/6

C. & W. WALKER, LTD

DONNINGTON

NEAR

WELLINGTON

SHROPSHIRE

Please send us your enquiries.

EIGHT SPIRALLY GUIDED GASHOLDERS

ALL TO THE SAME DESIGN

CAPACITY OF EACH: 300,000 CUBIC FEET

DIMENSIONS OF EACH GASHOLDER:
INNER LIFT, 71 ft. 0 ins. DIAMETER × 26 ft. 0 ins. DEEP.
OUTER LIFT, 73 ft. 9 ins. .. × 26 ft. 0 ins. ..

STEEL TANK:
75 ft. 6 ins. DIAMETER × 26 ft. 10 ins. DEEP.

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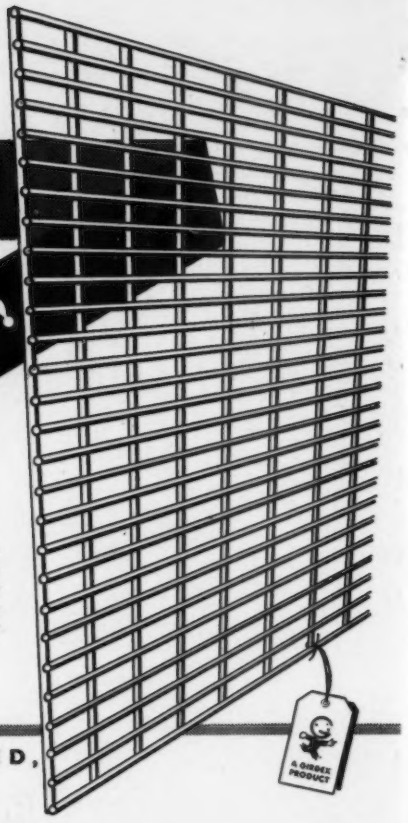
DETROIT

It's a perfect

screen!



. . . perfect for the grading and screening of coal, coke, stone, gravel, granite or sand.

Where unvarying dimension of aperture is important, where long-term resistance to abrasion is a "must", Weld-fabric is essential. Constructed of high-specification steel, rigid and durable, this mesh is virtually indestructible, whatever the material to be handled.

GIRDEX

For screens, graders, guards, partitions, storage racks, switchgear enclosures, Weld-fabric makes light of heavy duty; year after year after year

GIRDEX ENGINEERING COMPANY LIMITED,
WESTON LANE, TYSELEY, BIRMINGHAM, 11
Tel: ACOcks Green 2205 *Grams:* Girdexpres

GAS COMPRESSORS
HIGH SPEED VERTICAL RECIPROCATING TYPE. FOR PRESSURES UP TO 100 lbs. PER SQ. IN.

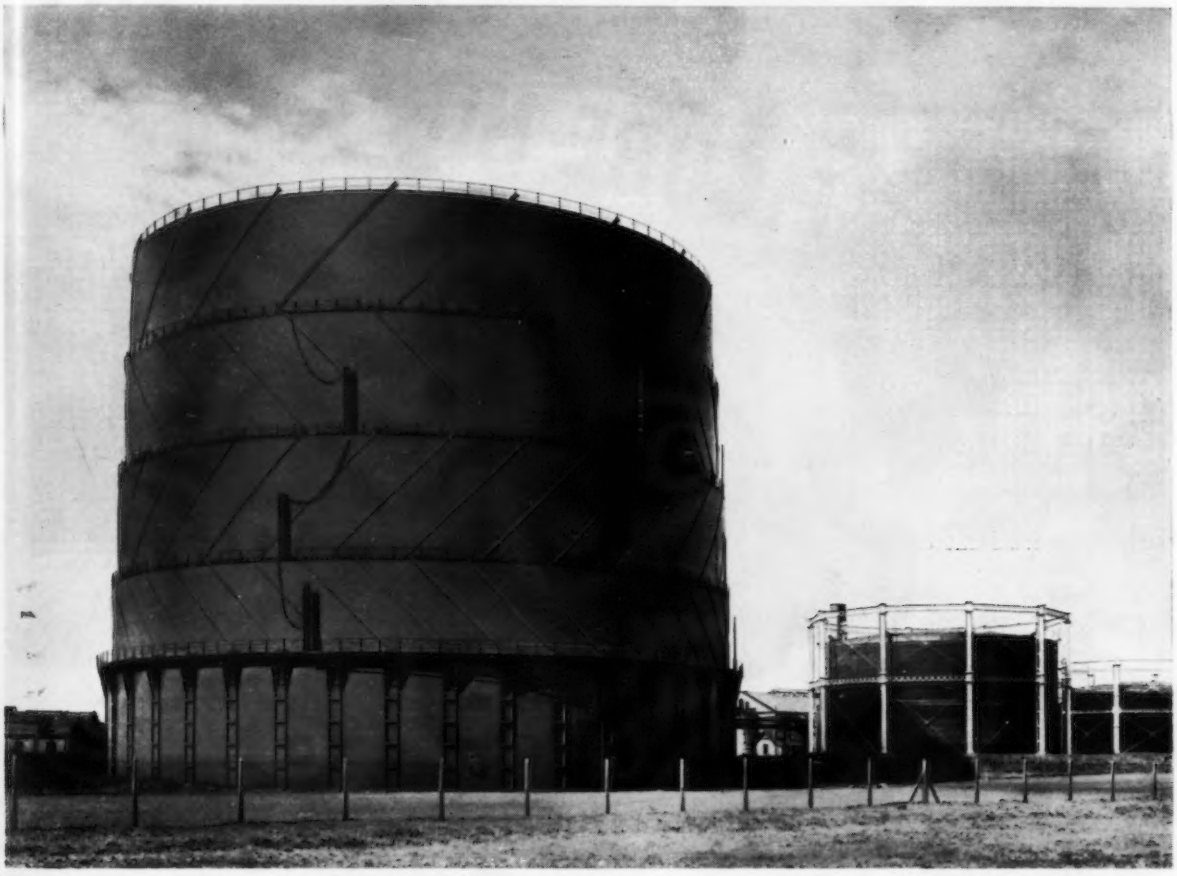
BASE YOUR DECISION ON APPLIED EXPERIENCE AND EFFICIENCY

- AUTOMATIC CONTROL
- FORCED LUBRICATION
- EASY ACCESSIBILITY TO WORKING PARTS

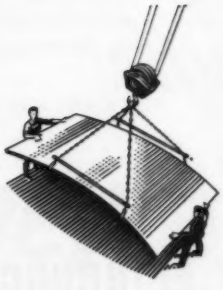
THE BRYAN DONKIN COMPANY LIMITED
DERBY ROAD • CHESTERFIELD • ENGLAND

WHESSOE —

AT BISHOP AUCKLAND



WHESSOE BUILDS WELDED GASHOLDERS



This 4 lift gasholder, which was built at Bishop Auckland by Whessoe for the Northern Gas Board, has a capacity of 3 million cubic feet, its steel tank being 183′ 3″ in diameter.
Like all gasholders built by Whessoe it is of welded construction and possesses consequent advantages. These include complete tightness, avoidance of corrosion pockets and lower repainting costs. Contributing to the latter feature are the form of construction and the pre-treatment of all materials by the Footner Phosphoric Acid Pickling Process.
During erection careful checks (including radiography of butt welds on the tank) were made to ensure high quality welding.

AN ADVERTISEMENT OF WHESSOE LIMITED DARLINGTON · LONDON: 25 VICTORIA ST. S.W.1

W.100

Peebles

& CO. LTD.

FIGURE NINETYEIGHT

A *Scientifically* designed **GAS GOVERNOR** which gives *Results.*

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COMPARE THE NEW

THAMES Traders!

with 4 and 6 CYLINDER DIESEL AND PETROL ENGINES

A NEW THAMES '5-STAR' RANGE*

30 CWT. 2-TONNER 3-TONNER 4-TONNER 5-TONNER AND (available soon) 7-TONNER

LOOK AT THE ADVANTAGES OF THIS NEW '5-STAR' RANGE:—

- INCREASED LOADSPACE—because of new Ford Forward-control with many more advantages.
- NEW RUGGED STYLING, maximum cab comfort, large single-piece curved screen, excellent front and rear visibility.
- SIMPLE MAINTENANCE, new engine and transmission layout, extra strong silent synchromesh gearbox, open drive shaft, banjo-type hypoid rear axle with alternative ratios.
- EXTRA POWERFUL brakes and finger-light steering.
- LADDER TYPE deep-section frame.
- THE RIGHT ENGINE for the job. Choice of the new 4 or 6-cyl. Diesel or Petrol engines ensures economy with performance:—

4-Cylinder Diesel Engine OR **4-Cylinder Petrol Engine**	*for 30 cwt. 2, 3, 4 and 5 ton trucks*
***NEW* 6-Cylinder Diesel Engine** OR ***NEW* 6-Cylinder Petrol Engine**	*for 4, 5 and 7 ton trucks 4½, 5 and 6 cu. yd. Tippers*

- EXTENSIVE RANGE of accessories and optional, factory-fitted equipment . . .

and FORD SERVICE, too!

SEE YOUR DEALER FOR FULL DETAILS AND PRICES

They're FORD Winners!

*The introduction of Thames Forward Control Traders does not affect availability of Thames semi-forward control trucks. This established range of vehicles (up to 4 tonners with 4-cyl. Petrol and Diesel alternatives) is still in full production and available from your Dealer.

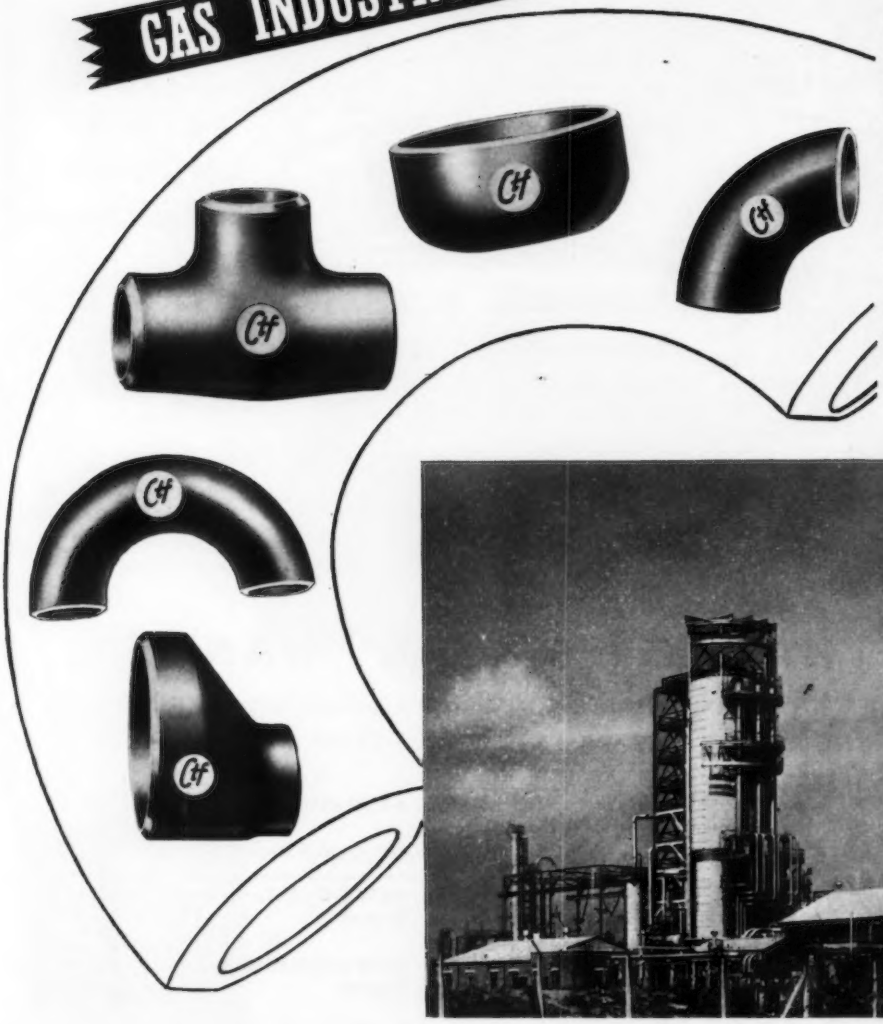
FORD MOTOR COMPANY LIMITED · DAGENHAM

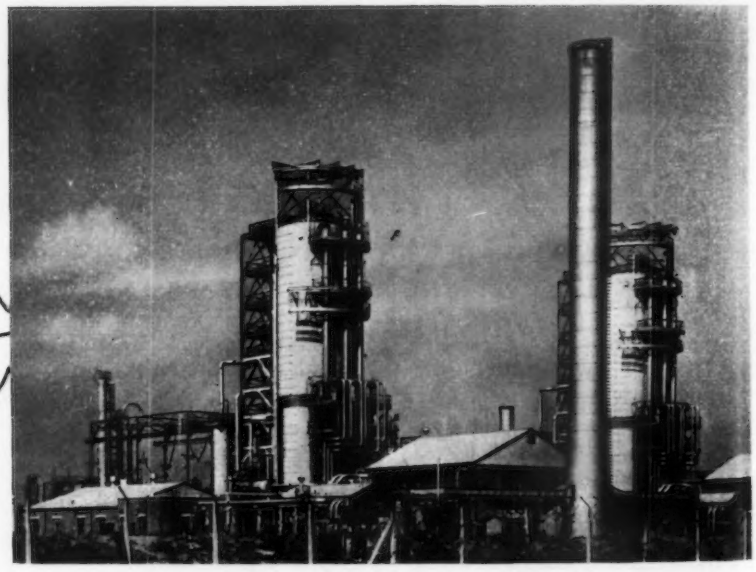
PIPE INSTALLATIONS FOR THE GAS INDUSTRY

Superior plant is the Potent Agent in achieving economical production.

GAS INSTALLATIONS require pipes and fittings that will give efficient service allied to well planned layout.

Shaw-Petrie and Clyde Tube Forgings Limited, manufacture, fabricate, and erect, to the highest specification, complete range of pipe-work and Seamless Steel and Alloy Butt Welding Fittings.





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CLYDE TUBE FORGINGS OF AMERICA
PORTLAND OREGON U.S.A.

THE surprised Miss in the picture finds it difficult to associate her pretty Nylon nightie with Crane giant valves. However, at the British Nylon Spinners factory these valves are performing jobs of vital importance during the early processing stages of the raw materials which go into the manufacture of Nylon. The industries which Crane giant valves serve are varied and numerous . . . and the giant valve is only one among a wide variety of Crane valves for high and low pressures—ranging from ⅛″ to 24″—each with a tradition of reliable, efficient service. Crane's reputation for reliability lies in their high standard of design, production and precision testing methods.

Among the country's largest industries using CRANE giant valves are:—
Esso Petroleum Co. Ltd. · Imperial Chemical Industries Ltd. · 'Shell' Refining & Marketing Co. Ltd. · Reed & Smith Ltd. · British Nylon Spinners Ltd. · Pfizer Ltd. · Firestone Tyre & Rubber Co. Ltd.

CRANE

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SCREW, BOLT or CAVITY FIXINGS

the Speediest way is best!

MODERN BUILDING MATERIALS can be a veritable nightmare to the man who has to deal with the problem of making SPEEDY, PERMANENTLY SECURE FIXINGS having either LIGHT or HEAVY LOADING CAPACITY at an economic cost.

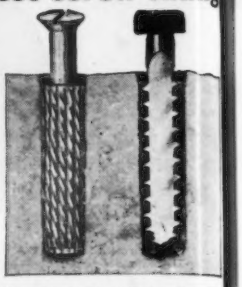
In the RAWLPLUG RANGE there are 21 different types of Fixing Devices, with a tremendous variety of applications. They provide the complete answer to every fixing problem in every kind of material. THE RAWLPLUG RANGE also includes 14 different types of tools for hole boring.

RAWLPLUGS

The World's Largest Manufacturers of Fixing Devices

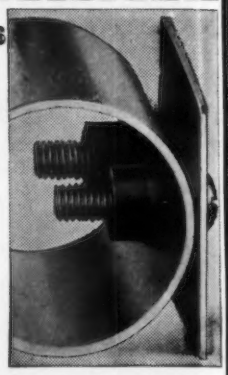
The world's speediest screw fixing

Rawlplugs make firm screw fixings in brick, tiles, cement, stone, etc., in a fraction of the time taken by any other method. Drill the material, insert the Rawlplug, screw up—it's as simple as that! Safe, permanent, and completely reliable in any climate. For all screw sizes up to ¾" coach screws.



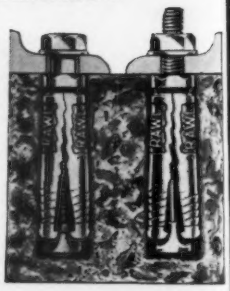
For Cavity fixings

For almost impossible jobs use the Rawlnut. (You can even make a fixing to a pipe). The tapped nut in the end of the rubber bush is drawn up to the reverse face of the material by turning the screw. The result is an airtight, watertight, vibration-proof fixing of enormous strength. For thin plastic, metal, wallboard and hollow pot, etc., it is invaluable.



Bolt it down in minutes!

For light or heavy bolting jobs, no other method even *begins* to approach Rawlbolts for strength, ease and speed. Rawlbolts are a *dry* fixing, they grip at once by expansion—no cold chiselling, no grouting in, no waiting for cement to harden. In all bolt diameters up to 1" in either loose bolt or bolt projecting types.



21 DIFFERENT TYPES OF RAWLPLUG FIXING DEVICES!

For Speed and Strength!

HAVE YOU A FIXING PROBLEM? For FREE TECHNICAL SERVICE send full details to:—

THE RAWLPLUG COMPANY LIMITED • CROMWELL ROAD • LONDON • S.W.7

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Since 1770...
. . . the name of Horseley has been associated with major British engineering achievements.
The early pioneering spirit, evidenced by the construction of the world's first iron steamship in 1822, is as strong today in meeting the challenge of contemporary engineering problems.
The Horseley Group offers a wealth of experience, and extensive facilities to meet the most exacting demands of Constructional, Chemical, Civil, Gas and Water Engineering.
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VIM
Leather Packings

VIM Leather Packings form a vital part in the operation of hydraulic, pneumatic and other mechanisms.

Resistant to oils, acids, gases, sea-water and high temperatures, they are guaranteed to last at least twice as long as any other leather packing for similar service.

We have in Birmingham a Leather Packings Division including a well-equipped factory engaged in the production of the celebrated VIM Leather Packings. Precise methods of manufacture, high quality of materials and rigid inspection are maintained.

A Service Engineer would gladly co-operate

Edgar Vaughan & Co. Ltd.

Leather Packings Division
BIRMINGHAM · 4 · ENGLAND

Initially

The name's the same but...

the 'T' now stands for THERMOPLASTICS

To enable the whole resources of our 10 factories to provide a greater service to industry, 'BTR' have withdrawn from tyre manufacture to concentrate on the widest range of thermoplastic and rubber products. Hence the change of name from British Tyre & Rubber Co. Ltd to BTR INDUSTRIES LIMITED. The well-known BTR trademark will remain the same to identify the great variety and the unvarying quality of the products which play so vital a part in so many industries

The BTR Group includes:

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BRITISH THERMOPLASTICS AND RUBBER MANUFACTURERS

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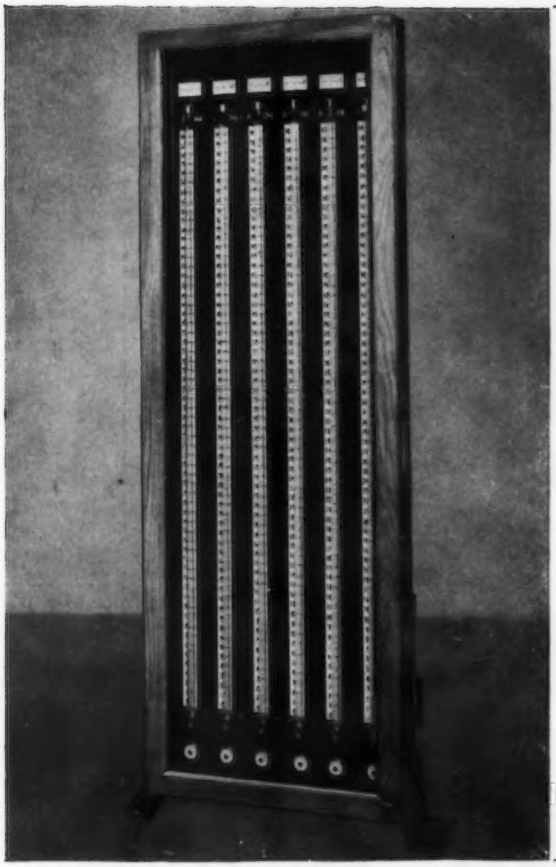

PRESSURE GAUGES

FOR

THE GAS AND CHEMICAL INDUSTRIES

Milne (Edinburgh) Ltd.

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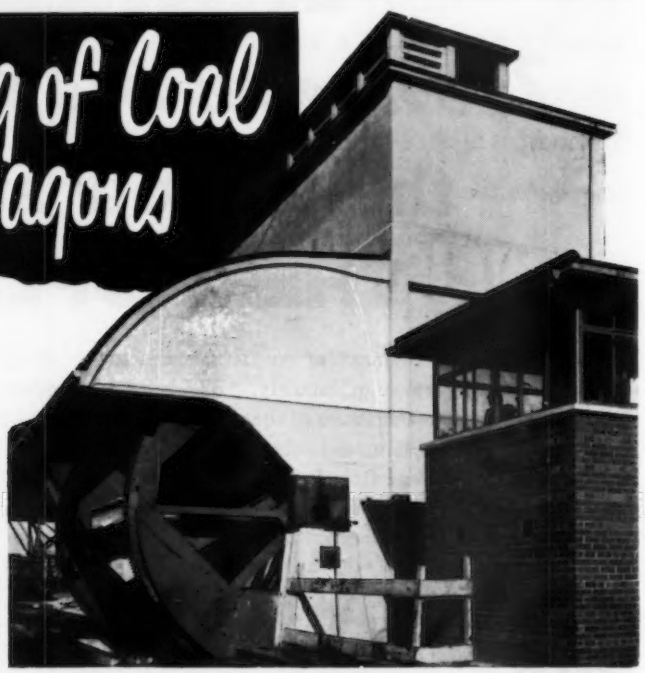
LEEDS BRANCH · MIDLAND METER WORKS · VICTORIA ROAD

Dustless tipping of Coal from Railway Wagons



by the

ROTASIDE TIPPLER

combined with the
Strachan & Henshaw
patented

DUST TRAPPING SYSTEM
No Fans! No Filters!
Very little power required!

Full particulars from—

STRACHAN & HENSHAW LTD

STEELHOIST WORKS BRISTOL 2 *Telephone 78331*

DRAKES of HALIFAX LIMITED

COKE HANDLING & GRADING PLANT

Photograph shows:

Coke Handling and Grading Plant with 500 ton capacity Hoppers installed for the Southern Gas Board.

Photograph published by courtesy of the Southern Gas Board.

1847 D 1957

Telephone: Halifax 4701 P.B.Ex. Telegrams: Draketed, Halifax

CONSTRUCTIONAL GAS ENGINEERS FOR MORE THAN A CENTURY

J.J.M.

Photograph by Courtesy of the South Eastern Gas Board, Dover and Woodall-Duckham Construction Company Ltd.

Development at the Dover Works of the South Eastern Gas Board is yet another fine example of co-operation between experienced planners and engineers, and the resources of an organisation with exceptional works facilities. The supply of structural steelwork has been Walker Bros. contribution to the new Woodall-Duckham Installation of Continuous Vertical Retorts at Dover. These retorts are capable of carbonising 821 tons of coal per day, thereby producing some 13 million cubic feet of gas. We are highly organised to tackle any structural steelwork problem, from design to erection and ninety years of specialist knowledge and experience is at your disposal.

Established 1867

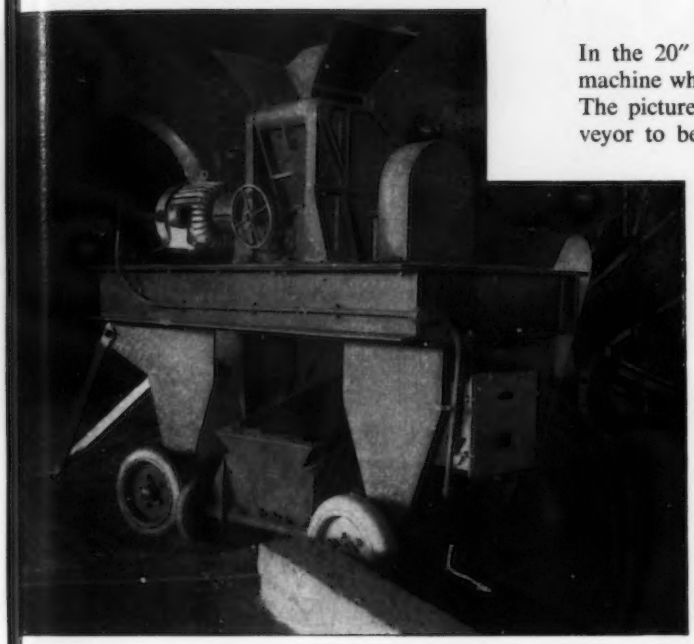
WALKER BROS
LIMITED
Structural Engineers

if it can be built in steel—we can build it

WALSALL · STAFFS · TELEPHONE : WALSALL 3136

London Office: 66 Victoria Street, S.W.1 · Telephone: VICtoria 3926

OXIDE CRUSHING the way you want it . . . where you want it



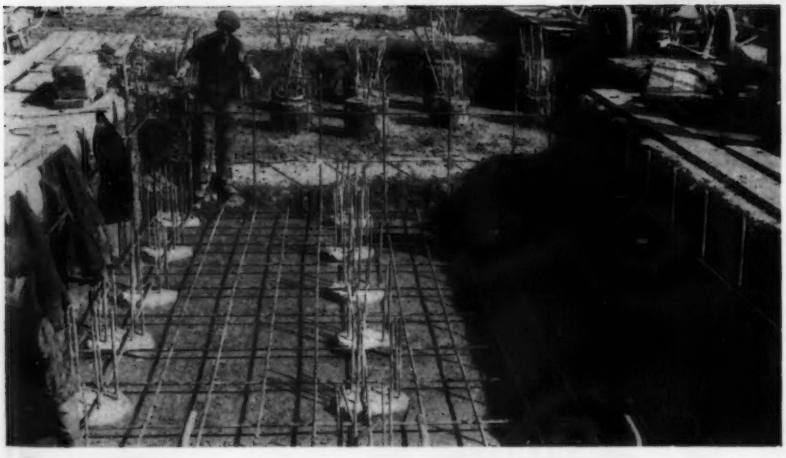
In the 20″ × 12″ B.J-D Oxide Crusher you have a machine which can be moved about easily and quickly. The picture shows that the bogie height allows a conveyor to be run underneath to receive crushed oxide. This B.J-D crusher and the larger, fixed 33″ × 24″ incorporate important features: breaker plate is adjustable during operation and can be swung wide open to allow passage of sticky oxide; no screen bars used.

BJD

oxide crushers

BRITISH JEFFREY-DIAMOND LTD.,
CRUSHER AND INDUSTRIAL DIVISION,
15-17 Caxton Street, London, S.W.1.

BORED PILES FOR THE N.F.U. KNIGHTSBRIDGE SITE



The heavy foundation loading from this building made normal footings for the columns out of the question —a condition frequently obtaining to-day when higher storeys are permitted. Piling was necessary and the close proximity of other buildings, including a Hospital, precluded the use of heavy driving equipment with its accompanying noise and vibration.

Cementation Bored Piles were selected by competitive tender and the foundation work was completed very successfully notwithstanding the difficult ground conditions unexpectedly encountered.

The CEMENTATION COMPANY LIMITED

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Tel. : RELiance 7654 (15 lines)

OFFICE WORKS : BENTLEY WORKS, DONCASTER
Tel. : DON 54175 & 54136

LEAK DETECTION

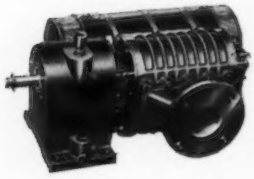
We provide a service for finding leaks in buried pipes quickly. Pipelines can be backfilled as laid, with the confident knowledge that should they not pass their test, the leaks can readily be found. The saving in expense compared with the old method of using ethyl mercaptan and the sense of smell, or digging up the line and going along with soap and water, is considerable. The technique is also applicable to aboveground lines or to plant, equipment, tubular heaters and condensers or any vessels which it is practicable to test by compressed air.

Further information will be gladly supplied on request.

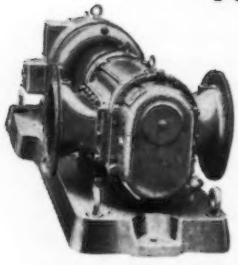
MAPEL

METAL & PIPELINE ENDURANCE LIMITED
Leak Detection Division, Abbey Grounds, Abingdon, Berks. *Phone:* Abingdon 1414

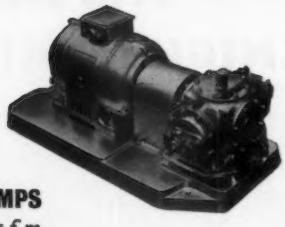
Godfrey Industrial Equipment



Positive Displacement



BLOWERS
VACUUM PUMPS
GAS BOOSTERS
SUPERCHARGERS
Oil free air or gas - flows up to 3,000 c.f.m. at pressures up to 10 p.s.i. - higher flows and pressures with multiple installations; for vacuum pumps, flows up to 3,000 c.f.m. at intake depressions up to 15" hg.



DIAPHRAGM PUMPS
Flows up to 1.25 c.f.m. at pressures up to 20 p.s.i.

RELIEF VALVES
2" and 4" bore.

ALL UNITS CAN BE SUPPLIED WITH MOTORS ON BASEPLATES

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"I found it extremely difficult to keep the speed of the Bedford down below 35 m.p.h., such is its lively performance."

The Commercial Motor, June 21st, 1957
Road Test of the Bedford 6-tonner

BEDFORD'S OWN DIESEL

ECONOMY

"At an average speed of 26 m.p.h. (laden), the total fuel used indicated a rate of 18·1 m.p.g., which is an extremely economical figure . . . unladen and when driven at normal speeds, a consumption rate of 26·4 m.p.g. was returned."

The Commercial Motor, June 21st, 1957

"Remarkable fuel economy . . ."

says

THE COMMERCIAL MOTOR

"Fast acceleration . . . remarkable braking efficiency . . . good hill-climbing performance . . . extremely economical . . . " These are just a few of the comments made by the Commercial Motor following a recent road test of the heavy-duty Bedford 6-tonner powered by Bedford's own new diesel. And when it comes to performance with economy the new Bedford diesels *prove* that they cut the cost of power to lower levels than ever before. This diesel unit is an option for the Bedford normal and forward control 4-ton, 5-ton and 6-ton range. It is the most modern 6-cylinder direct injection diesel on the market and top value for money. Get full details from your local Bedford dealer, or write for literature to Vauxhall Motors Ltd., Luton, Beds.

CUT THE COST OF POWER WITH

Bedford

ULTRASORB ACTIVATED CARBON

ULTRASORB Carbons are available for recovery of most industrial solvents, benzole extraction, water purification and other gas and liquid phase applications.

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CARBO - UNION - WHESSOE

Activated Carbon Recovery Plant for the purification of gases and the recovery of vapour phase solvents.

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4 in. Reconditioned Cast Iron Flanged Pipes 9 ft.
VALVES for GAS, WATER and STEAM
Sizes ¼ in. to 36 in. in C.I., gunmetal and steel.
STEEL TUBES
All Sizes up to 24 in. Flanged, Plain ends, Screwed and Socketed, Loose Flanged, Victaulic and Unicone Joints.

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CRADLEY HEATH, STAFFS.
Telephone: Cradley Heath 6264-5-6. *Telegrams:* Pipes, Cradley Heath.

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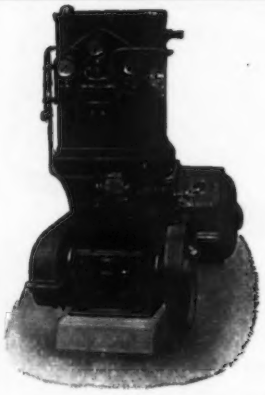
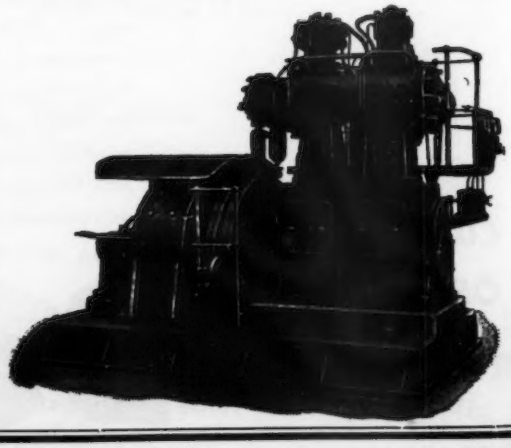
Quarterly Volumes of the 'Gas Journal'
9/6 each, post free
Walter King, Ltd., 11, Bolt Court, Fleet Street, London, E.C.4.



HIGH PRESSURE GAS COMPRESSORS *for*
pressures up to 5,000 lbs. per sq. in.

The illustrations show two high pressure gas compressors. As specialists in the design and manufacture of compressors for both air and gases, we make compressors for a wide range of capacity and pressure up to 5000 lbs. per sq. inch.

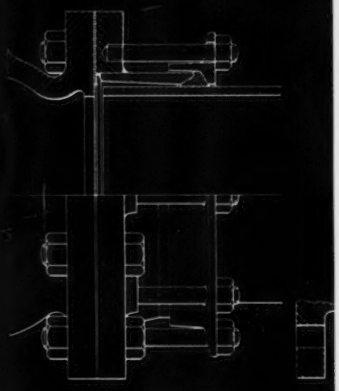
The compressor shown above has a capacity of 25 cu. ft. of free hydrogen per minute compressed to 3000 lbs./sq. inch. The illustration on the right shows a four-stage compressor with a delivered capacity of 200 cu. ft. of free town's gas per minute compressed to 5000 lbs. per sq. inch.



For full information regarding gas compressors, write, giving particulars of the duty required, to—

REAVELL & CO., LTD.
RANELAGH WORKS, IPSWICH
Telegrams: "REAVELL, IPSWICH." Phone No. IPSWICH 56124 (3 lines)

FOR PLAIN-ENDED PIPES



FLEXIBILITY

Viking-Johnson couplings are used on plain-ended pipes of steel, iron or other material.

Flexibility permits angular deflection up to 6°.

The couplings are made in sizes up to 100 inch.

'Junior' couplings are available for ½-in. to 2-in. pipes

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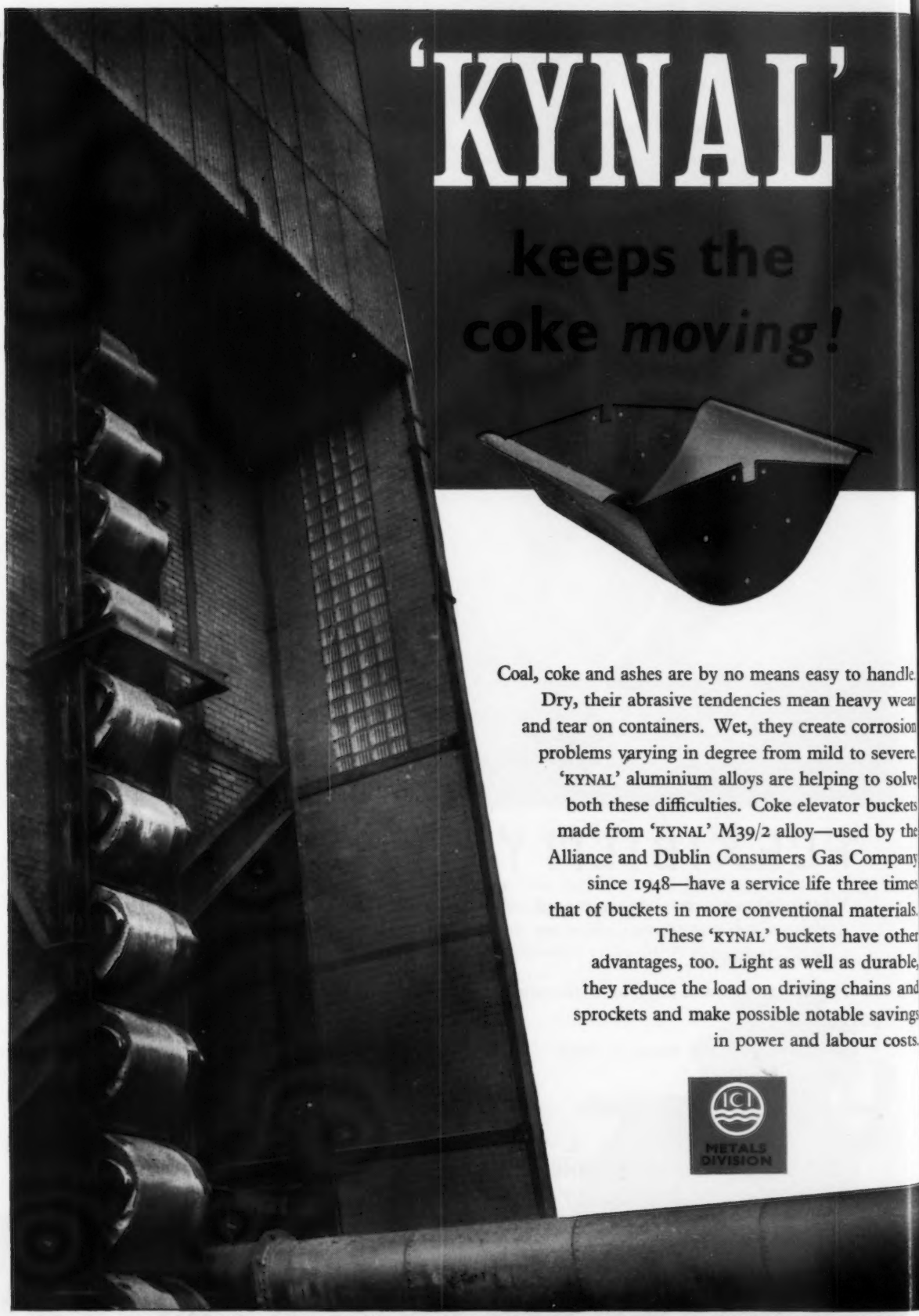

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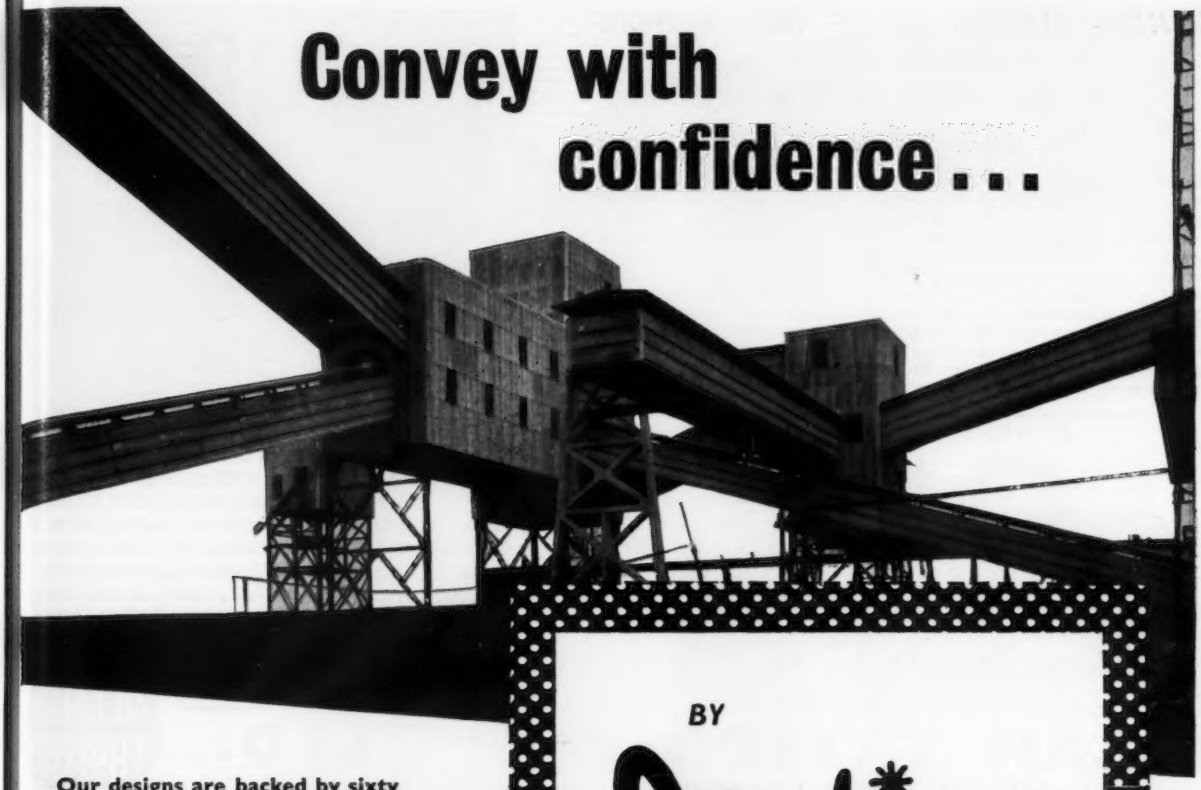

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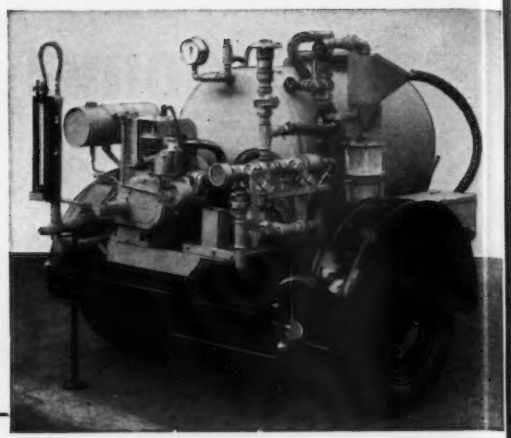
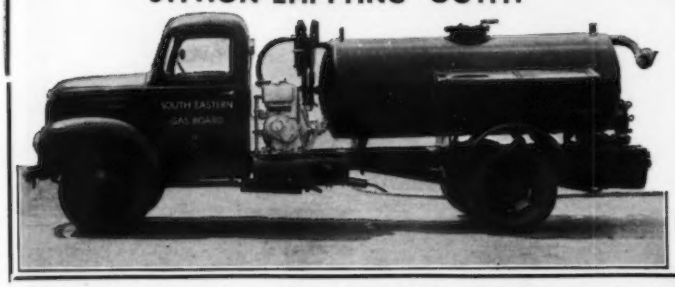


SYPHON EMPTYING OUTFIT



The Vacuum Syphon Emptying Outfit illustrated is mounted on a 4 ton **Thames** Chassis. A 600 gallon galvanised tank is fitted. A rotary type exhauster is driven by a 4 b.h.p. four-stroke air cooled engine, mounted on a sub-frame behind the cab. The tank is fitted with a flame-proof vent and the outfit can be used for high or low pressure syphon emptying. A large manhole at the rear allows the tank to be cleaned easily. A sight glass is fitted to enable the operator to know when the Syphon is emptied. Twenty-five feet of 1½ in. suction hose is supplied with the outfit. The outfit can be used for vacuum or pressure working.

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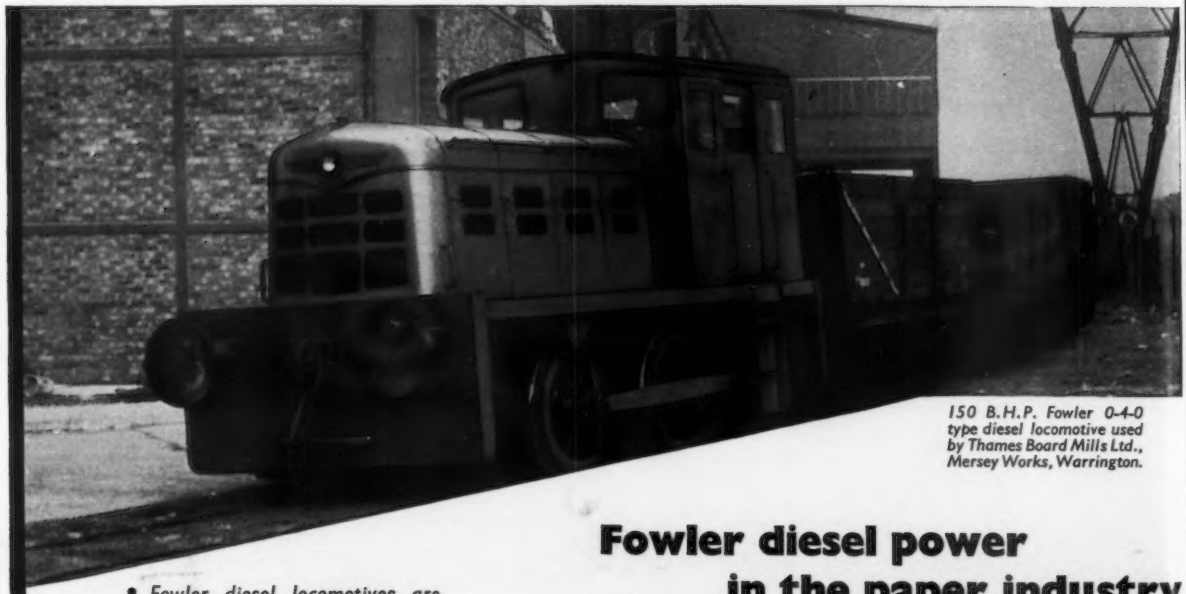

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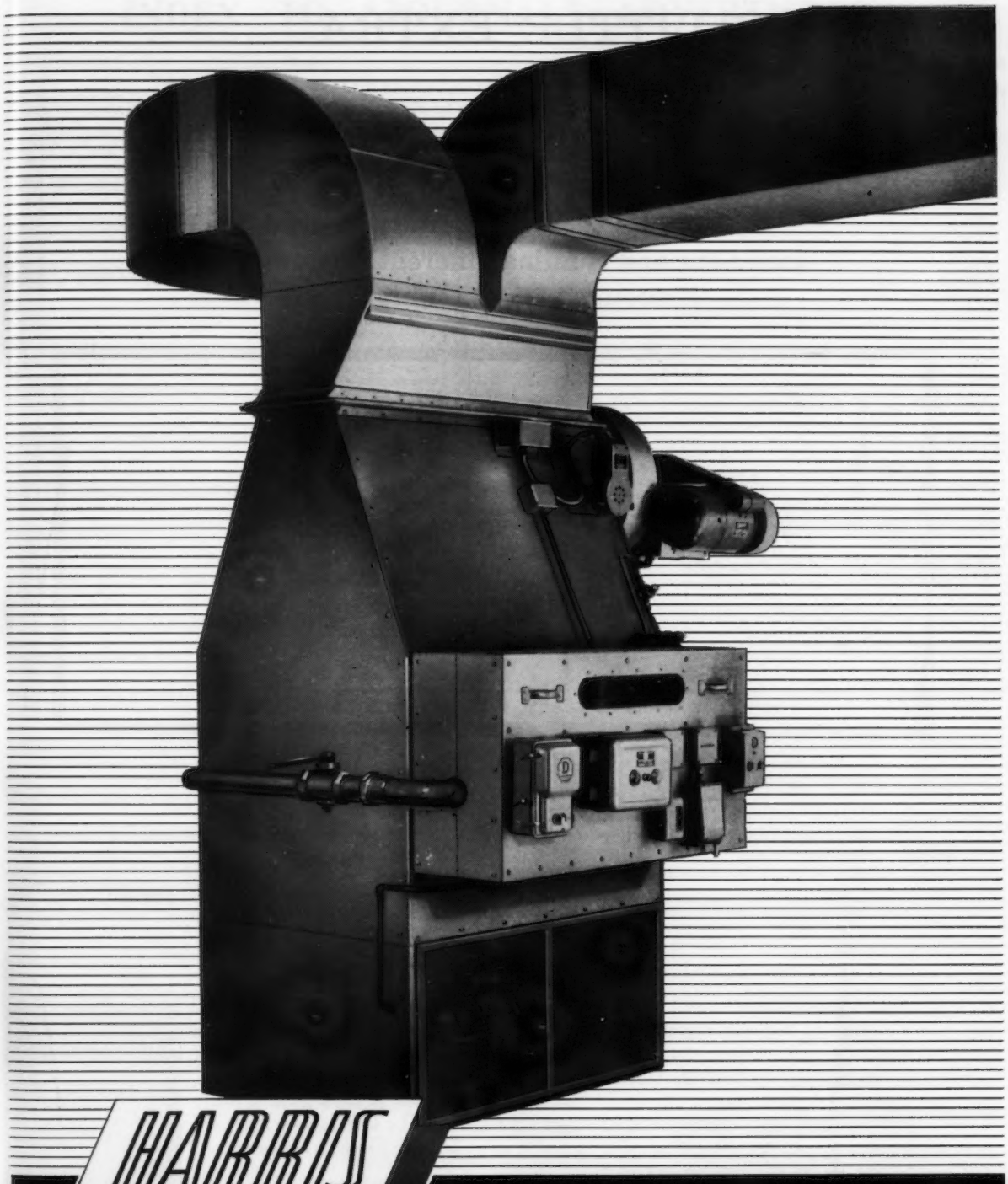

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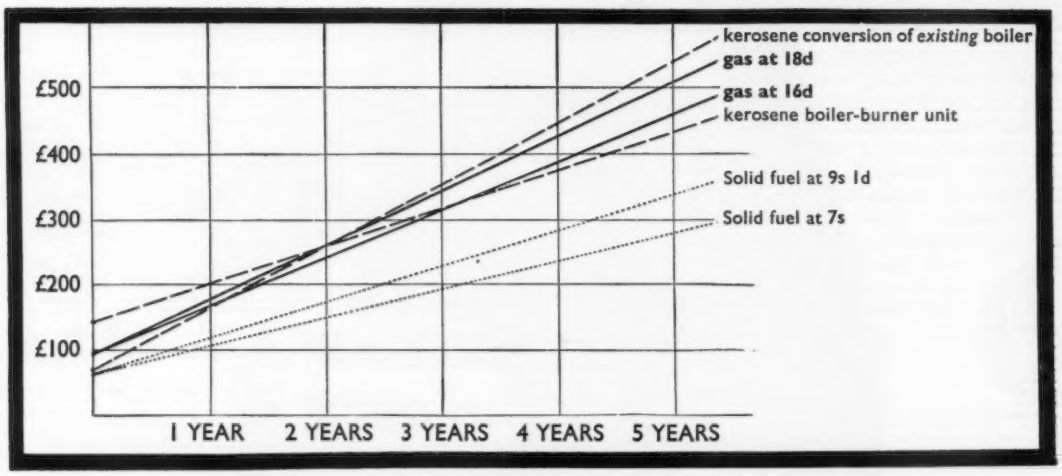

NOTES

In calculating the initial outlay, the price taken for a gas-fired boiler is that of the 'Diplomat' 44; prices for other types of boiler are typical.

Installation costs are assumed typical figures, to the nearest £5.

Figures for running costs are based on annual usage at full output and full efficiency as follows: fully automatic 'Diplomat' 44, 1500 hours; semi-automatic coke boiler, 1800 hours (i.e. each type of boiler providing equivalent service).

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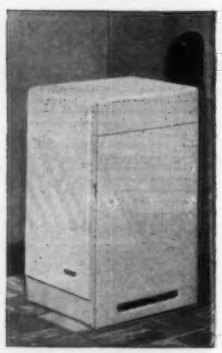

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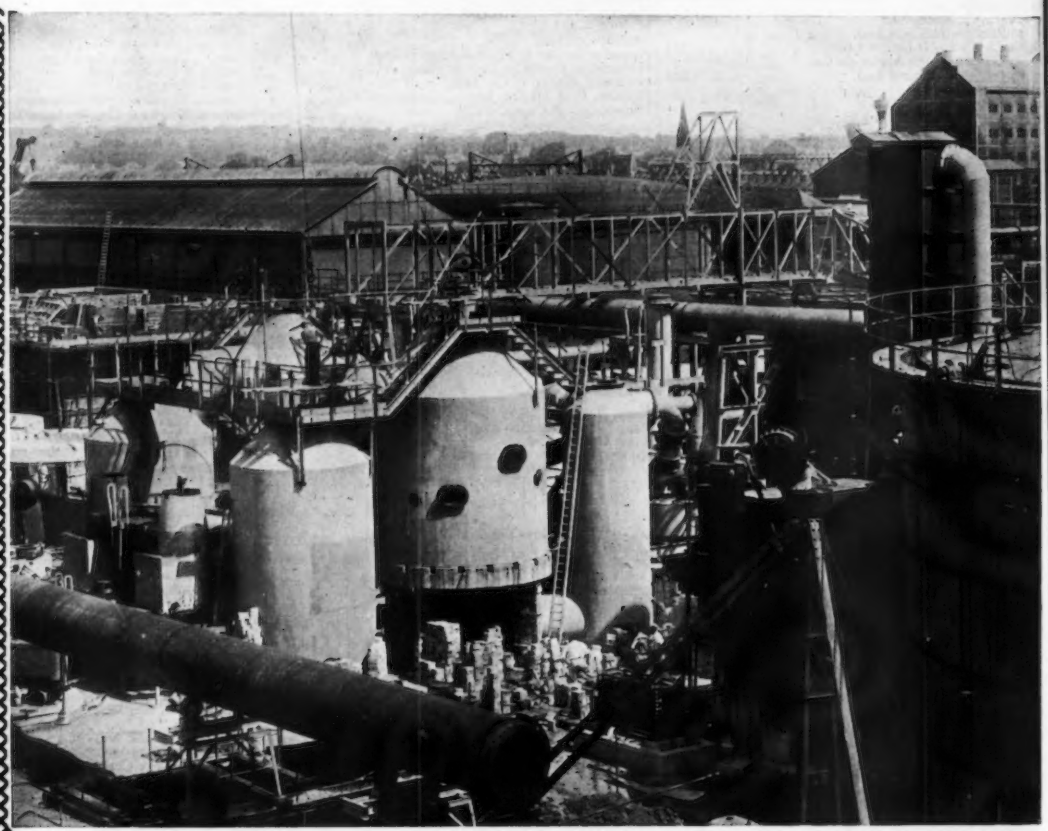

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Gas Journal

VOL. 291 *NO. 4914* *September 18, 1957*

109TH YEAR

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Gas Journal

VOLUME 291. No. 4914. SEPTEMBER 18, 1957. 109th YEAR

Nuclear Power

AT first sight it might seem strange that a paper on nuclear power should be published in a journal devoted to the gas industry, but in this issue we are doing that very thing. In the minds of the laymen—and everyone outside the Atomic Energy Authority or those concerned in the design or running of nuclear power stations are laymen in this extremely specialised branch of science—there is likely to be a very excusable confusion between atomic energy and nuclear power. It would, we think, be a fair distinction to say that atomic energy deals with the basic scientific fact which must be mastered before any great technical advances can be made, the very fact that when a radio-active material undergoes some change in the constitution of its nucleus in the formation of some other element, energy is evolved. Nuclear power on the other hand deals with the harnessing of this energy to do useful work, whether in a weapon of war or as a source of energy, the production of which is economically competitive with more conventional sources of energy and can be applied in the world of commerce.

It is quite definitely the latter, of which Mr. J. V. Dunsworth, of the Atomic Energy Authority, writes in the paper we are publishing. In it the author has set out the many problems which must face all connected with this source of power which was quite unknown 20 or 30 years ago. There were radio-active elements being discovered by scientists, but they had got little further than exploring the possible application of these elements to medicine, to combat cancer and other forms of malignant growth. The idea of making use of this vast potential as a useful form of power can only have been conceived within the last decade or so. The spur given to research in nuclear physics was the urge to win the race in producing the atomic bomb; once the race had been won, what to do with the knowledge in a war-weary and energy-starved Europe, must have seemed somewhat like the fulfilment of a back-room boy's wildest dreams. Not only was the theoretical knowledge there, but someone, and that was the State, wanted to spend money on developing it.

In the last 12 years since the war ended the rate of development of nuclear power production in the United Kingdom and the United States has been truly prodigious. It is true, we think, to claim, all things being equal, that the rate of development in the United Kingdom has been more remarkable than anywhere else in the world. There is no doubt at all that the U.K. leads the world in the production of nuclear power. Perhaps the incentive to do so was greater here than anywhere else. Our infinitely greater need to speed up our industrial activity after the change from a war-time to a peace-time economy meant that industry must have energy. Basic forms of energy were difficult to come by: Coal was in short supply; our oil refineries were not yet built; and our solid fuel-fired power stations were hopelessly overloaded.

The incentive then was there, and fortunately the country could call on the best scientific brains, many of whom had worked on the atomic bomb projects in America, to develop the existing knowledge and to discover by research new facts and new methods.

Perhaps the incentive may not have been quite so great on the other side of the Atlantic. The United States have abundant sources of energy unknown in this country. She can call on her resources of natural gas and oil, and her coal deposits are infinitely greater than those in this country. Once the theoretical knowledge could be successfully applied to the commercial use of atomic energy, the problems involved were largely engineering and metallurgical. The successful commercial exploitation of this new form of energy depends very largely on doing it on a sufficiently big scale, and it was to problems in chemical engineering on a vast scale that the engineering industry had to turn its attention. Even when the design and production problems had been overcome, the demands on metallurgy were enormous. Metals must be found to contain the radio-active material or 'fuel' and allow free passage or be able to obstruct neutrons, as the case might be, and yet be physically strong enough without being too bulky.

The types of reactor which are being used and are

likely to be used in the future are discussed by Mr. Dunsworth, and it is interesting to read his remarks on the several systems of moderators and coolants now being used or being developed as a result of intensive research. He remarks almost in passing that the 'fuel' for nuclear power production is much less expensive to import than other forms of fuel, in fact it is probably the smallest item in the cost of production.

How does all this effect the gas industry? It is unlikely that nuclear power will supplant the use of gas, since every form of energy will be needed in this country if the present level of industrial activity is to be maintained. It may even considerably assist it if research into the production of higher temperatures from atomic energy are achieved and can be applied to carbonisation. Possibilities also exist for the synthesis of gases on a large scale by the application of atomic energy to the simplest raw materials. So perhaps the more we know of what we think is our competitor, the more we are safeguarding our costs of production in the distant future.

Lostock Hall

BY commissioning the new carbonising plant at Lostock Hall, Preston, the North Western Gas Board is forging yet another link in the chain of production plants which will feed the integrated grid system now almost completed in the industrial belt of south Lancashire and north Cheshire. The supply at Preston may be looked upon as the northern section of it since by the time Preston is reached industrial activity has begun to slacken and the type of consumer is changing. The area of supply into which some of the gas made at Lostock Hall may one day pass, will include the old Fylde Group, which has now been absorbed into the present West Lancashire Group and includes the famous holiday centre of Blackpool, where the holiday season greatly assists the load factor during what might otherwise be the slack period of gas demand.

Preston has always been gas-minded and shares with Liverpool the distinction of being one of the first two provincial towns to build a gasworks. In 1815 gas companies in both these places were founded almost simultaneously and it seems both flourished.

The Preston gas company decided to move its works out of the town in 1924, and bought land at Lostock Hall on which to build; the present east works was the outcome of that decision. After nationalisation of the industry in 1949 the policy of centralisation of gas production in the newly-created Preston Group caused the group to buy more land at Lostock Hall for extensions to their carbonising plant.

The C.O.L. intermittent vertical chamber plant, which we describe at some length in this issue, was the result of this policy, and the first effect of its commissioning was the closing down of two obsolete production stations which, together with the closing down of a third six months or so earlier, concentrated the whole production of the old Preston group at Lostock Hall.

Provision has been made for a C.O.L. plant of equal capacity to be built at some future date which would increase the production capacity of this works by a further 4.2 mill. cu.ft. of gas a day. This would enable any further increases in gas consumption to be met by production at Lostock Hall, and if the West Lancashire group were to be completely integrated by a connection between Preston and Kirkham, the production of gas in this part of Lancashire would be undertaken in three production stations—Marton, Eastham (near Lytham St. Annes) and Lostock Hall. Any grid connection to the south of the group area seems unlikely. Eastham is, however, a comparatively small plant and might at some future date be superseded by grid supplies from one of the other manufacturing stations.

The Lostock Hall plant has several unusual features which would strike the ordinary visitor as both novel and ingenious. The chamber house is on a piled foundation which culminates in a reinforced concrete platform 13 ft. above ground level. On this platform the plant has been erected and in the central aisle between the two benches which are worked almost as separate entities, are placed cast iron grids through which ventilating air may enter the chamber house and pass out through three ventilators in the roof. Since the 'windows' consist of 'glazed apertures' containing glass blocks and cannot be opened, this is the only means of ventilating the building. It has the effect of taking off any fumes from the top of the benches while keeping the rest of the building 'nicely aired' and free of cold draughts. The free space under the chamber house provides useful storage accommodation for the storing of such things as refractories.

Perhaps the most interesting feature about this works is the water supply. To overcome possible shortages and the expense of buying large quantities of town water, it was decided to collect all the surface water and all water from plant from which water was an effluent, such as condensers and coolers, and store it in a central reservoir, from which it would be pumped back for works use. This project has been so successful that the total water consumed by *both* old and new works per ton of coal carbonised has dropped by almost 30%. Now the use of town water is confined to boiler feed water. This would seem to be a remarkable achievement.

A problem that faces all station engineers today is the disposal of harmful effluents. At Lostock Hall all ammoniacal liquor is first dephenolated and then converted to concentrated ammonia solution. The effluent from the concentrated ammonia plant could be rendered completely innocuous, as the North Western Gas Board are doing at their plant at Denton, but since Preston is on the Ribble Estuary, a less elaborate but none the less ingenious method was considered as meeting the case. Since the works ammonia liquor had been dephenolated and any H_2S had been removed in the concentration plant, the spent liquor might safely be discharged into the sea provided it did not come upstream into the town reaches of the estuary; it must only be discharged on the ebb tide. This is what is being done. Tide clocks automatically control an electric mechanism which releases spent liquor from a discharge station at the mouth of the estuary as the tide ebbs.

Here then is another example of what can be achieved by ingenious planning in conjunction with the skill and ability of the contractors who serve the gas industry so well.

Personal Notes

MR. FREDERICK NORMAN HOWES, M.C., Group Manager, Chelmsford, Ipswich Division, Eastern Gas Board, is retiring on September 28. Educated at Doncaster Grammar School and as an external pupil of Sheffield University, Mr. Howes is a member of the Institution of Gas Engineers and of the Institute of Fuel. In 1909 he was articled with the Doncaster Corporation and was a junior assistant. In the First World War he served as a lieutenant in the Signals branch of the Royal Engineers, serving in France and Italy. Besides being awarded the Military Cross, he was also Mentioned in Despatches. Mr. Howes then joined the South Metropolitan Gas Company as a Shift Engineer at East Greenwich, later serving as an Assistant Engineer at Rotherhithe and other stations. In 1924 he helped in the construction of new works by Burnley Corporation, and in 1930 he joined the Chelmsford Corporation. From 1942-45 he was engaged in the production of balloon hydrogen for the Air Ministry. Mr. Howes was President of the Eastern Gas Managers' Association in 1946-47.

MR. WILLIAM FIDDES has been appointed Special Technical Representative for Arkon products, by Walker, Crosweller & Co., Ltd., Cheltenham. These products include gas flow recorders, pressure and vacuum recorders, remote reading instruments and flow indicators. Mr. Fiddes is an Australian and was trained at Broken Hill Proprietary Steelworks Co., Ltd., at Newcastle, New South Wales, Australia. His services are to ensure closer and better co-operation between the Company and their customers in the fields of gasworks and gas users, foundries, collieries, potteries, glass works, paint, chemical, cement works, and food factories, etc.

MR. J. C. NEVILLE, Chairman of J. C. Neville, Ltd., when visiting Australia and New Zealand in January and February next, intends to visit customers and to promote sales of the RG tube cutting and screwing machines. He is sailing in the s.s. Orion calling on the way at Gibraltar, Aden, Colombo, Fremantle, Adelaide and Melbourne. He is due to arrive at Sydney on December 26, and hopes to visit Brisbane before proceeding to New Zealand. Mr. Neville will be pleased to meet interested engineers to explain the advantages of these portable thread milling machines. Correspondence should be addressed to him, c/o Orient Line.

Obituary

MR. HARRY CATTON died suddenly at his home earlier this month. Mr. Catton, who served for 40 years in the gas industry, was with the Richmond Gas Stove Co., Ltd., and latterly was Midland Regional Controller of Radiation Group Sales, Ltd., Gas Division. He retired at the end of last year.

The EARL of SCARBROUGH, Lord Lieutenant of the West Riding of Yorkshire, has accepted an invitation to open the Gas Council's fifth Sales and Service Conference, which is to be held at Harrogate from October 1 to 3.

ALDERMAN J. H. LEWIS, O.B.E., of Birmingham, has been reappointed Chairman of the West Midlands Gas Consultative Council.

Diary

September 17-20.—ASSOCIATION OF PUBLIC LIGHTING ENGINEERS: Annual Conference. Town Hall, Torquay.

September 18.—I.G.E., SOUTH WESTERN SECTION: Exeter. Visit to Exeter Manufacturing Station. 'The Specialised Vehicle—Its Place in the Transport Fleet,' by A. W. Mahoney.

September 21. — EASTERN JUNIORS: National Farmers' Union Headquarters, Park Street, Lincoln. 11 a.m. General Meeting and Presidential Address.

October 1-3.—GAS COUNCIL: Fifth Sales and Service Conference, Harrogate.

October 18.—MIDLAND SECTION, I.G.E.: Autumn Meeting, the Staveley Iron & Steel Co., Ltd., Nr. Chesterfield, 11 a.m. 'Some Aspects of, and Recent Developments in Plant for the Compression of Gas on Distribution Systems,' by R. W. Nelson.

Power-Gas Has Visitors

Three Swedish representatives of Jönköping, Sweden, with Mr. W. J. Cutler (second from left) of the Gas Plant Division of the Power-Gas Corporation, Ltd., outside the Company's South Works during a recent visit to Stockton-on-Tees.

Eastern Golf and Scottish Bowls Meetings

AN Eastern area golf meeting at Thetford attracted 44 golfers from the Board's five divisions and headquarters. The day was such a success that it was decided to hold the meeting annually on the same course on the second Sunday in May.

The principal award, the W.E. Cup, presented by Mr. E. C. Woodall, a member of the Board, and Mr. R. H. Epps, Secretary, was won by the Tottenham No. 2 team, consisting of Mr. L. Sutton, Mr. W. P. Banks, Mr. D. Doyle, and Mr. J. A. Davies, who organised the meeting. Their net aggregate score was 310 strokes. Second was the Tottenham No. 1 team and third the Watford team.

Outstanding round of the day was that of Mr. N. A. Webber of Cambridge, winner of the Individual Medal competition, whose score, with a handicap of 6, was 69 net. He went out in par and dropped only one stroke on the return, so his gross score was only one stroke more than the course bogey of 74. Second was Mr. F. Snow of Ipswich, gross 90, handicap 20, net 70, and third was Mr. Davies of Tottenham, gross 87, handicap 16, net 71.

Mr. Webber, in partnership with Mr. L. Goodship, Tottenham, won the Greensome Stableford pairs competition in the afternoon, with 38 points. Mr. A. Norton, Tottenham, and Mr. E. C. Woodall, Headquarters, were second with 36 points, and third were Mr. J. Simons, Tottenham, and Mr. W. A. Love, Norwich, with 35.

On August 31 the Scottish Gas Board, Edinburgh Division, beat the Scottish Association of Gas Managers Bowling Club by 79 shots to 61 shots in the annual match held at the Scottish Gas Board social welfare bowling green, Granton.

Substantial Salary Increase for Gas Council Members

CONSULTATIVE CHAIRMEN'S PAY DOUBLED

AN increase of £2,500 in the salary of the Chairman of the Gas Council and higher salaries for the Deputy Chairman and for chairmen and members of area boards were announced last week in a Government White Paper.

The Chairman of the Council, Sir Harold Smith, will now receive £8,500 a year, while the Deputy Chairman, Sir Henry Jones, will have a salary of £7,500 instead of £5,000, as previously.

These increases, which are part of a general raising of the remuneration of nationalised boards intimated by the Prime Minister at the time of M.P.'s pay rises last July, took effect on July 1.

Chairmen of area boards are now to receive £6,500 per annum instead of £4,500, while deputy chairmen will have £5,000 instead of £3,500. A full-time member of an area board will receive £4,000 instead of £3,000 and a part-time member £1,000 instead of £500 per annum.

The salary of chairmen of consultative councils goes up to £1,500 from £750.

CHANGE OF ADDRESS

Drake-Didier-Kogag Ltd., have moved their registered offices to 69, Shay Lane, Halifax. Telephone: Halifax 4701; Telegrams: Dikoc, Halifax. The move will result in the availability of extra engineering staff from Drakes of Halifax with whom Drake-Didier-Kogag is associated.

SUMMER COKE PRICES END THIS MONTH

THE British Coking Industry Association announce that on October 1 winter prices will come into operation for hard coke, which will mean an increase of 9d. per cwt. (except in Scotland, South Wales and Northumberland, Cumberland, Westmorland, Durham and the North Riding of Yorkshire, where the summer/winter price scheme does not apply).

In London and the South of England (excluding the south-west), there will be a further increase of 2d. per cwt. to compensate in part for higher railway freight charges. In London, there will be an additional 1d. per cwt. on retail prices as a result of higher distributive costs.

West's Get Northern Board C.O.L. Contract

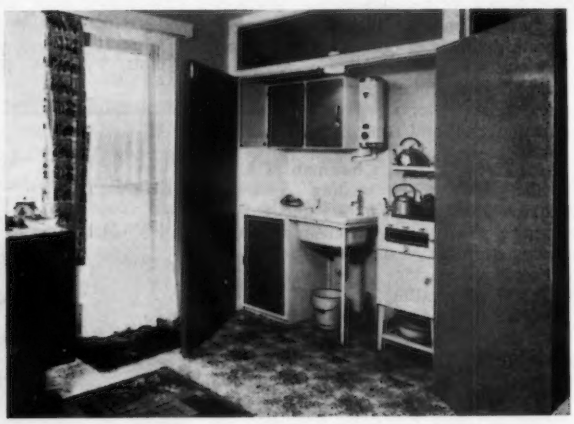
A CONTRACT has been placed with West's Gas Improvement Co., Ltd., by the Northern Gas Board for the construction and erection at their Sunderland gasworks of a C.O.L. installation of intermittent vertical chambers for a daily production of 8 mill. cu.ft. of gas.

The plant will consist of four benches, each with three settings of six chambers, heated by hot gas generated in outside mechanical producers, the whole to be similar to the plant installed at the Board's Howden gasworks.

The contract covers the provision of an extensive system of coal mixing and storage bunkers, coke screening and storage bunkers and coal and coke handling machinery.

U.K. Coke for Burma

A cargo of British coke was shipped from the Tyne the other week to Burma, the contract having been obtained against Continental competition. The coke, the first to be shipped from the Tyne to Burma, is being taken to Rangoon by the Hong Kong steamer Landspride.



Left: *Princess Margaret leaving Dame Colet House after the opening ceremony.* **Right:** *The Kitchen which shuts away in a cupboard.*

The Kitchen Which Shuts Away in a Cupboard

A KITCHEN which shuts away in a cupboard is one of the features at Dame Colet House in Stepney, opened recently by Princess Margaret.

Administered jointly by the St. Paul's Girls School Union for Social Services and the Stepney Housing Trust, the building comprises a community and social centre for the recreational enjoyment of the neighbourhood, six flatlets for old people and administrative quarters.

Situated in the commercial district of the North Thames Gas Board, Dame Colet House has well-planned and comprehensive gas services. Each of the six flatlets is fitted with a Radiation gas/coke fire, and the 'kitchen in a cupboard' containing an Ascot gas water heater over the sink, a Stoves Kitchenette gas cooker, and a check meter.

Two bathrooms, each with its own Ascot multi-point water heater are shared by the tenants. Additional gas appliances in the building are two multi-point and four sink water heaters, five gas fires (two panel types and three convectors) and a London cooker (used for catering and tea-making purposes in connection with the community and social centre).

The Intermittent Vertical Chamber house and waste heat boiler annexe at the New Kingston Works, Isle of Wight, of the Southern Gas Board.
30 - 3¾ ton chambers with a daily gasmaking capacity of 3.8 million cubic feet of 475 B. Th. U. gas after producer gas dilution.

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CONSTRUCTION COMPANY LTD.

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Showing the modern façade of the new office block.

BECKTON'S NEW OFFICE BLOCK

Replaces 'Temporary' Premises Since 1940

A NEW office block for staff at Beckton gasworks was informally opened recently by Mr. Michael Milne-Watson, Chairman of the North Thames Gas Board. The old administration block on the works was completely destroyed during an air attack on Beckton in 1940, and the temporary accommodation used by the staff since then has long proved inadequate for modern requirements.

Forming part of the programme of development and reconstruction in progress at Beckton, the new block is designed in the most modern style. Throughout its interior the emphasis is on light and space.

Wages Speed-up

On the ground floor is housed the Station Accountant's office, which has been specially arranged so that payment of wages to the many employees at Beckton can be carried out speedily and efficiently.

Above are the offices of administrative; engineering and other senior staff, and also the station drawing office. A canteen is incorporated, and the building also accommodates the Safety, Labour and Welfare Officers.

Seen on the steps of the new office building are Mr. G. Dougill, Planning Engineer; Mr. J. Cross, Deputy Station Engineer; and, nearest camera, Mr. H. Bradley, Station Engineer.

B.K.L. Alloys Ltd.

B.K.L. Alloys Ltd., Birmingham Factory Centre, Kings Norton, Birmingham 30, the makers of 'Tubend' seamless welding fittings, have opened a London office at 16, Berkeley Street, W.1, telephone—MAYfair 2779 (2 lines), under the management of Mr. C. M. Powell.

INTEGRATION

The Scottish Gas Board have informed St. Andrews Town Council that it is intended to provide the town's gas supply from a grid system and that the local gasworks will be closed down within two or three years.

Gas Pamphlet Described as 'Mud-slinging'

DIVISIONAL MANAGER REPLIES TO CRITICS

CRITICISM of a pamphlet issued by the Central Division of the Scottish Gas Board was expressed at a meeting in Glasgow on September 5 of the South of Scotland Electricity Consultative Council.

The meeting agreed, however, not to indulge in a 'mud-slinging propaganda match' and no further action is being taken.

Meals Ruined

Councillor J. Sullivan, Glasgow, the Chairman, described the pamphlet as 'rather cheap propaganda which cast some reflection on the wisdom of using electricity for cooking purposes.'

A gas official in Perth, he said, had made use of a newspaper cutting describing how, at 6.56 p.m. on a particular date, the electricity supply had failed and as a result many evening meals had been more or less ruined.

Confusion

'If the two Boards get down to the level of picking out each other's failings and indulging in a mud-slinging competition, it will lead to nothing but confusion and misunderstanding,' said Councillor Sullivan. 'I am quite certain that if persons in the Electricity Board's service started to take cuttings of newspaper reports reflecting adversely on the Gas Board, they could get any number of examples, but where would that take us?'

A Cutting

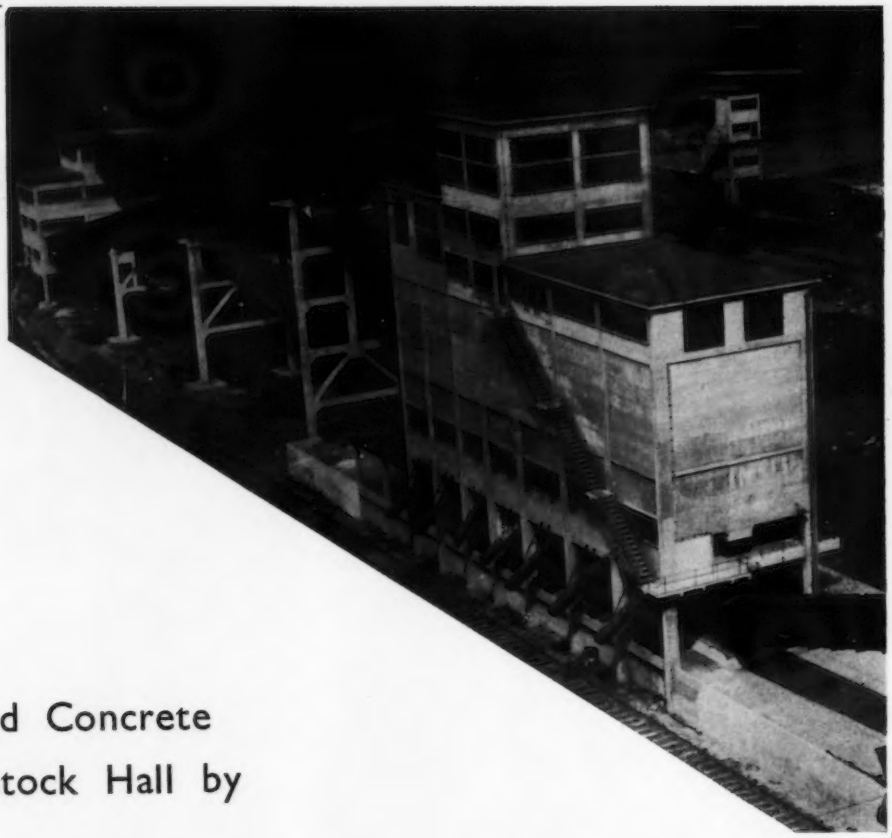
The 'gas official' who circulated the pamphlet, Mr. W. N. Baird, General Manager of the Central Division of the Scottish Gas Board, said in Perth later that he had taken a cutting from the *Electrical Times*, had it reprinted in pamphlet form, and circulated it among local authority representatives in his own area.

'Helpful'

'I do not regard that as mud-slinging,' he said. 'I thought the views of an electrical engineer on the subject of cooking by gas or electricity would be helpful to the local authorities.'

Mr. Baird added that the Gas Board were seeking a free choice for people going into new council houses. At present many were getting all-electric equipment whether they wanted it or not.

Coke Bunker
for
N.W. Gas Board
at
Lostock Hall



All Reinforced Concrete
Work at Lostock Hall by

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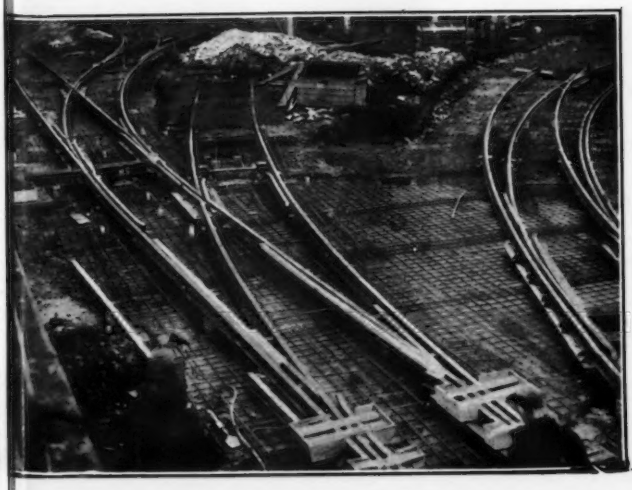

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EXHAUSTERS . . .

Photograph by kind permission of the North Western Gas Board.

. . . at Lostock Hall Works, Preston

At the new Lostock Hall Works of the North Western Gas Board the Exhausters are by **Waller.** Three sets of steam-driven Roots type machines have been insulated, each having a capacity of 180,000 cu.ft. per hour against a pressure differential of 54" w.g. They are driven by 40 BHP steam engines.

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The North Western Gas Board's Works at Preston was piled by FRANKIPILE

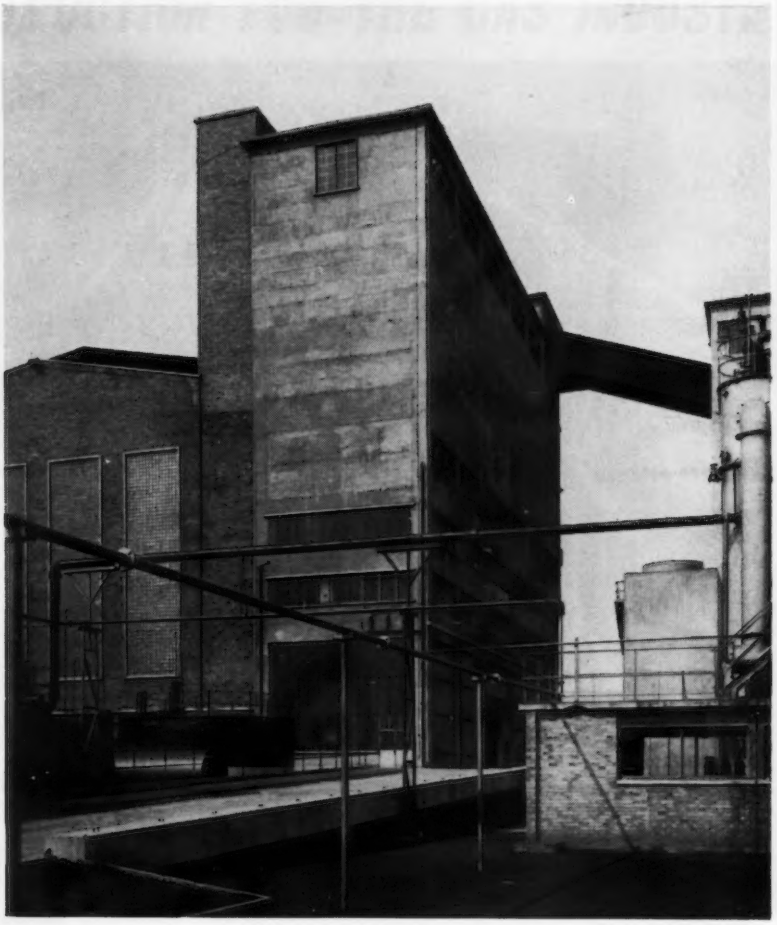
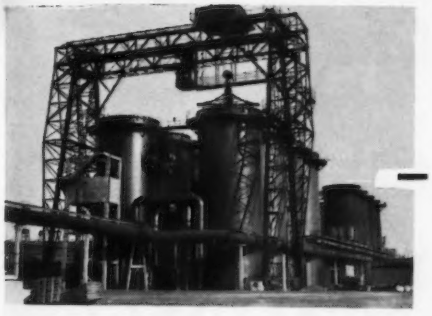


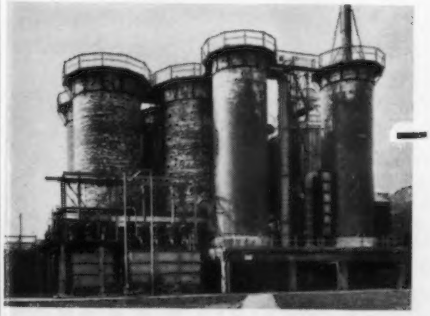
Photo by Courtesy of the North Western Gas Board



Photos by courtesy of the South Eastern Gas Board

——— piled by FRANKIPILE

Tower Purifiers for the South Eastern Gas Board, Greenwich



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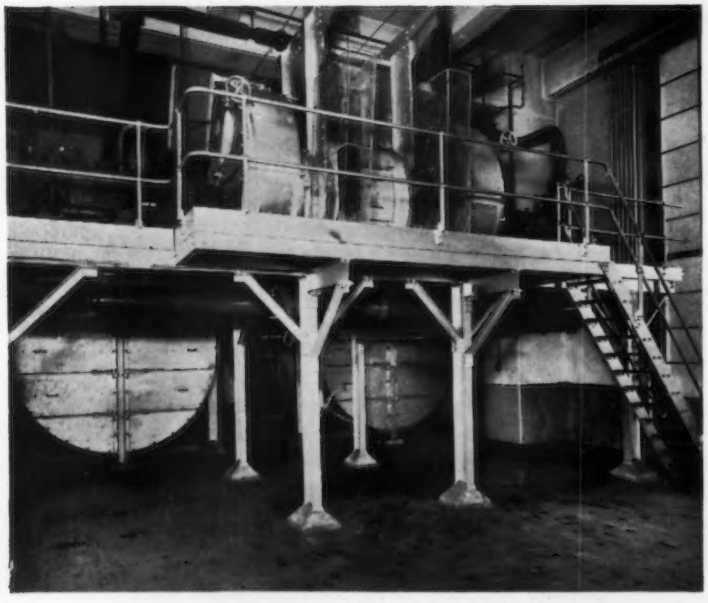
WASTE HEAT RECOVERY IN THE *Gas Industry*



SPENCER-BONECOURT

waste heat recovery plant was selected to serve the West's C.O.L. Intermittent Vertical Chamber coal carbonisation plant installed at the Lostock Hall Works of the North Western Gas Board, Preston.

Two Spencer-Bonecourt waste heat boilers (one working, one standby) serving the new carbonising plant at Preston. Photograph by courtesy of North Western Gas Board.

consult the specialists in waste heat recovery

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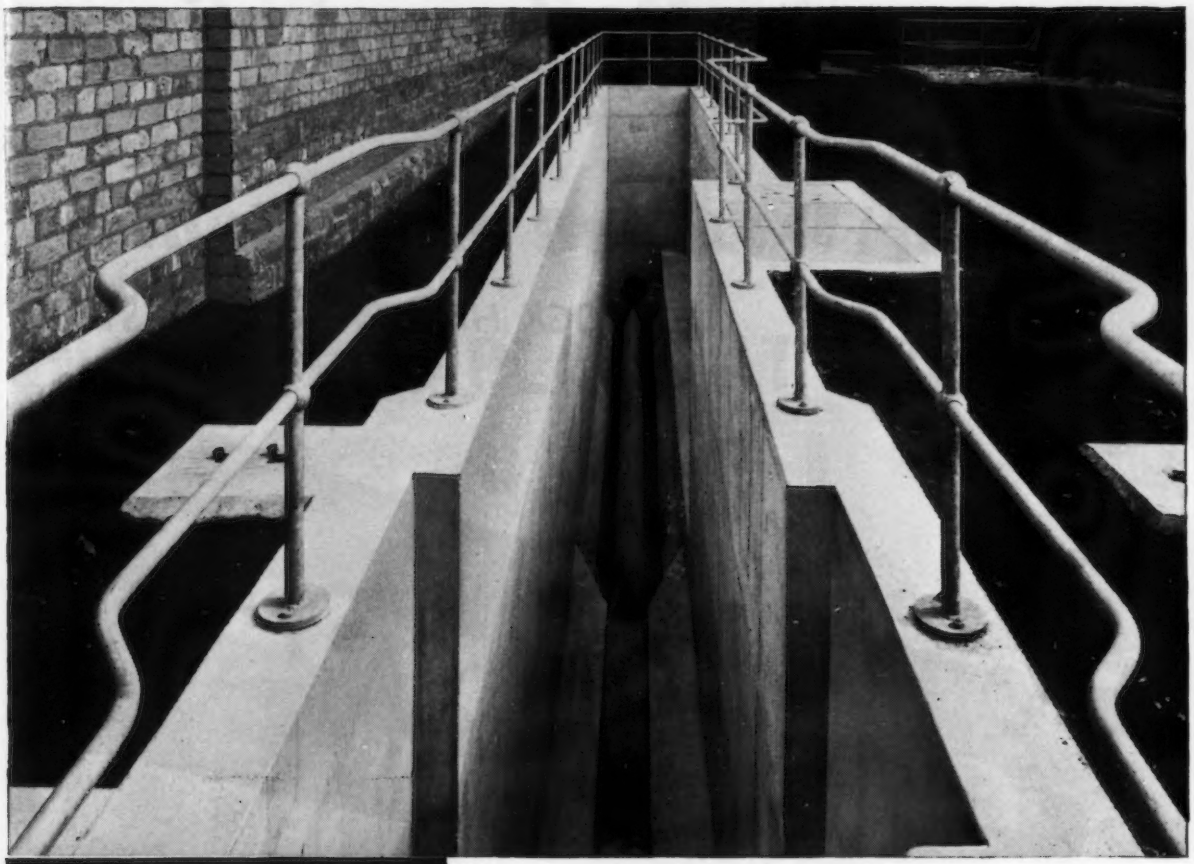
CONCRETE CONSTRUCTION FOR THE GAS INDUSTRY



Photograph by permission of North Western Gas Board

yet another contract entrusted to

CONCRETE FLUME AT ATHOL STREET WORKS, LIVERPOOL

The reinforced concrete flume and grit channels, for cleaning and measuring gasworks effluent prior to entering Corporation sewer, is a typical example of public works contracts which to an increasing degree "Norwest" are being called upon to handle. This contract involved working to unusually fine tolerances in concrete construction. In 35 years 'Norwest' has become a civil engineering and building organisation of national significance and offers a complete service including preparation of designs and the layout of schemes to suit clients' special needs.

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LONDON AREA: 147 Haling Park Road, SOUTH CROYDON. Tel.: Croydon 4605

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PROTECTION

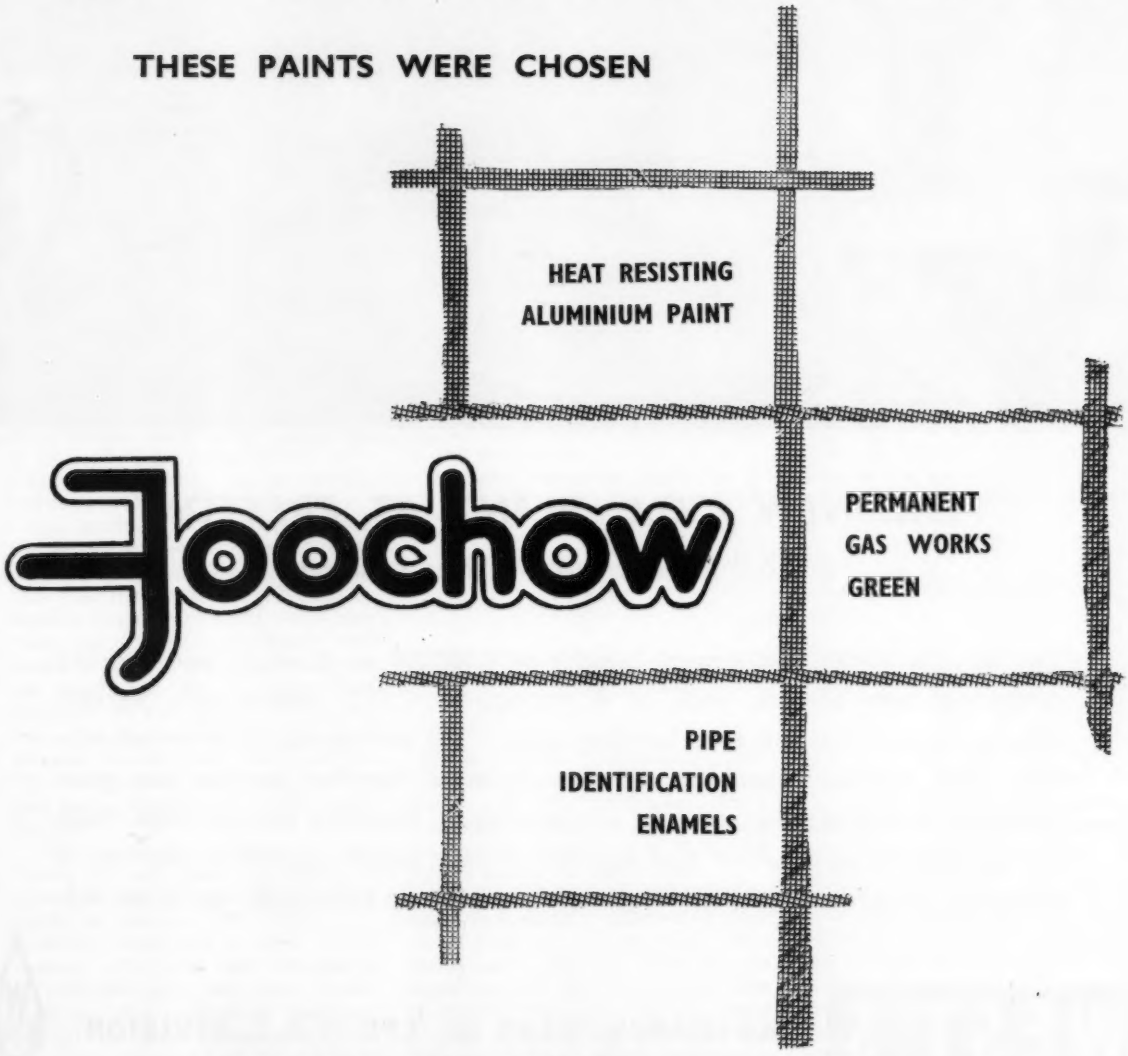
and

DECORATION

of the

NEW I.V.C. PLANT AT PRESTON

THESE PAINTS WERE CHOSEN



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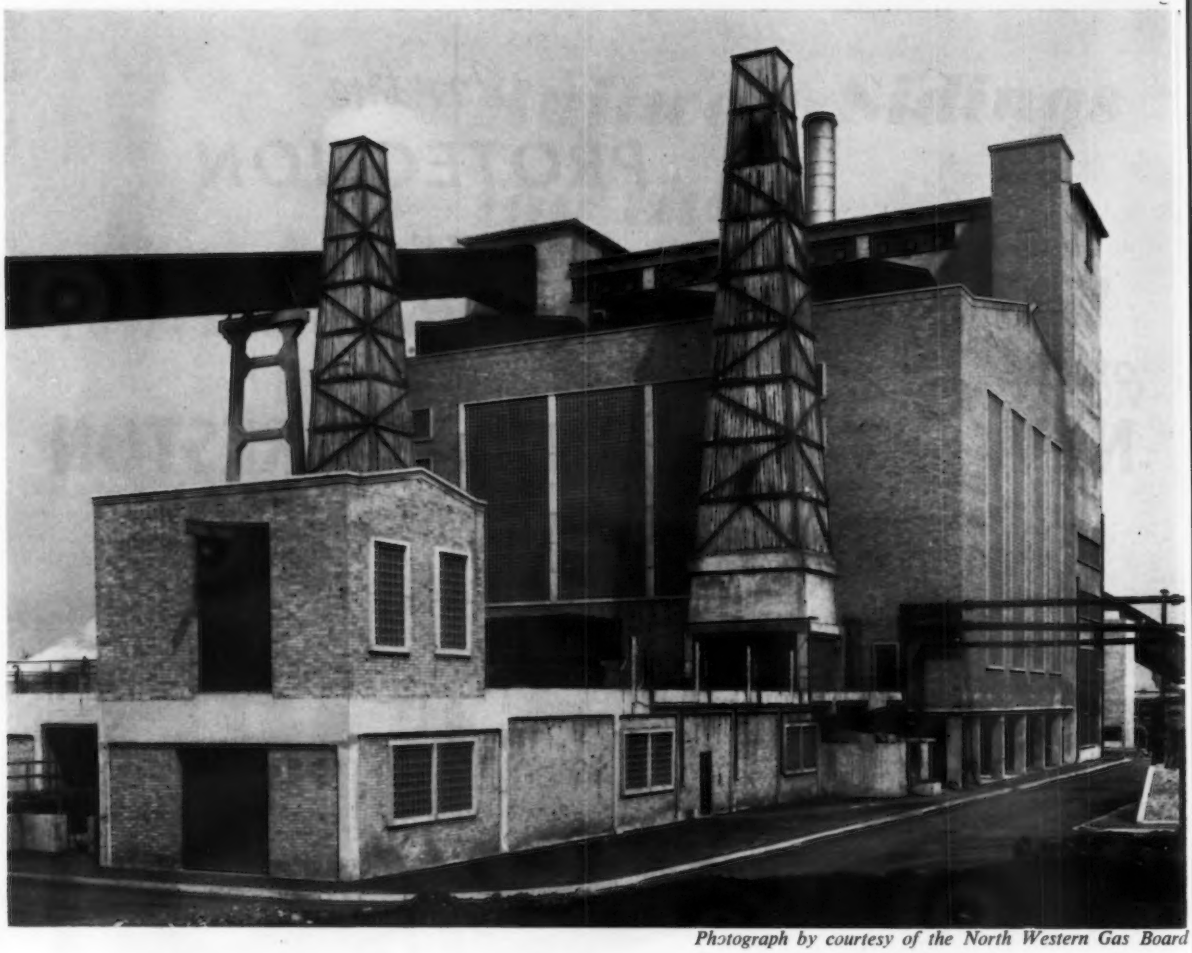

Photograph by courtesy of the North Western Gas Board

THE NEW C.O.L. PLANT AT PRESTON

40 C.O.L. INTERMITTENT VERTICAL CHAMBERS

This new installation has a rated capacity of 4,000,000 cu. ft of gas per day and consists of two benches, each of 4 settings of C.O.L. Intermittent Vertical Chambers, with coal and coke handling plant. The settings are built as independent units and are heated by the combustion of hot fuel gas from step-grate producers built integrally with the recuperators. Provision has also been made for the addition of a further two benches to meet future extensions which would eventually bring the total gas production of the plant up to 8,000,000 cu. ft per day.

WEST'S GAS IMPROVEMENT CO. LTD (C.O.L. DIVISION)

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HEAD OFFICE: ALBION IRONWORKS, MILES PLATTING, MANCHESTER 10. TEL.: COLLYHURST 961

A general view of the West works showing the chamber house and the CWG plant in the background. The coke handling plant with the coke stocking ground and railway sidings can be seen in the foreground.

Lostock Hall, Preston

PRESTON shares with Liverpool the unique distinction of being one of the first two provincial towns in the British Isles to start gas manufacture. The Chartered Company was founded in London in 1812, and by 1815 a coal gas company had been formed in Preston, almost simultaneously with one in Liverpool.

The tradition of gas manufacture and supply in Preston, therefore, is of long standing, but it was not until 1924 that the Preston Gas Company decided to move its works out of the town and to build a completely new works at Lostock Hall, three miles to the south on the Leyland road alongside the East Lancashire railway line. For this purpose they acquired 34 acres of land upon which to build. The works were completed in 1931 and had a capacity of 5 mill. cu.ft. per day.

The increased demand for gas during the war made it necessary to extend the gas-making capacity of this works so that in 1944 further carbonising plant with a daily output capacity of 1.5 mill. cu.ft. was added. In 1949, five years later, two 1.5 mill. cu.ft. per day carburetted water gas plants were added, bringing the total gas-making capacity of the works to 9.5 mill. cu.ft. per day.

As a result of nationalisation, the newly-constituted Preston Group of the North Western Gas Board decided to centralise production in its area at the Lostock Hall works, and to close down works at Garstang, Leyland and Chorley. This made it necessary to extend the gas-making plant once more, and for this purpose a further 6.35 acres of land adjoining the site was bought.

The new extensions consist of a 4.2 mill. cu.ft. per day intermittent vertical chamber carbonising plant, complete with coal and coke handling plant and all ancillaries. These extensions constitute a separate works —called the West works to distinguish it from the old, or East works.

Site clearance for the West works began in June, 1953, followed by work on the piled foundations shortly afterwards, and by January, 1956, the coke screening plant was put into operation to deal with coke from the East works during times of peak production. This was followed by the commissioning of the sidings in August of that year, and gas-making began in the new intermittent vertical chamber plant in the following November, which allowed production at the other three obsolete gas-making plants in the Group to cease by December.

The site of the new works is on a hillside, so that fairly extensive civil engineering operations were involved, including excavating clay soil, much of which was used for filling the low areas and for constructing the railway embankment on which the sidings have been laid out. Even so it was necessary to dispose of some 50,000 cu. yards of soil. This means two main terraces have been formed and a retaining wall has been built between the chamber house and the ancillary plant area. Since it would have been difficult to build this wall of reinforced concrete, a sheet steel pile wall has been constructed instead.

As a part of the civil engineering work, main roads and an adequate draining system were laid out. By means of the drainage system all surface water and all water discharged from individual pieces of plant can be collected and brought to a single point of disposal. It was decided, therefore, to construct a prestressed

Described by C. J. P. DE WINTON,
T.D., M.A., M.Inst.Gas E., M.Inst.F.
Technical Editor.

PHOTOGRAPHY (EXCEPT WHERE OTHERWISE MENTIONED) BY STEPHEN TENNANT, A.R.P.S.,
GAS JOURNAL Staff Photographer.

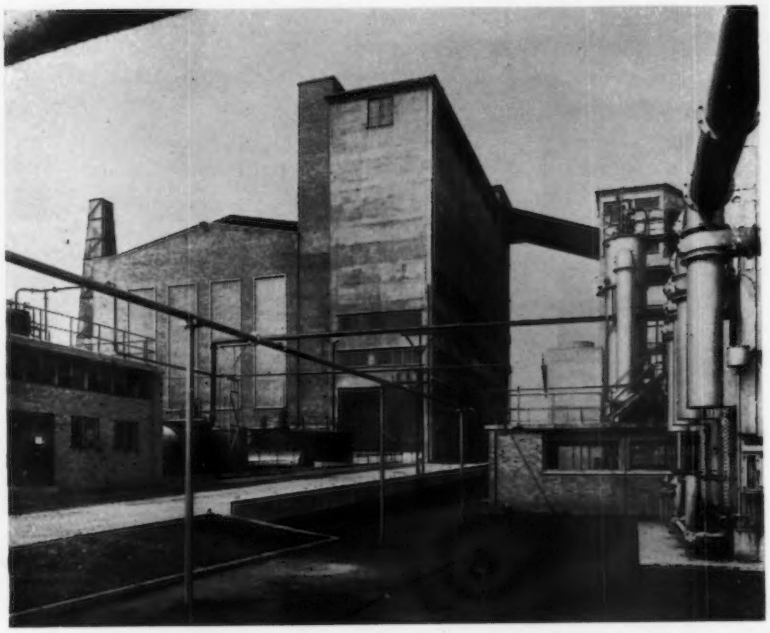
concrete reservoir to collect and store all this water, from which it could be drawn away for various uses in the works. Any overflow from this reservoir is discharged into the Council sewer, but as this is only of small capacity, the discharge of water must be kept low. The building of this reservoir has gone a long way towards solving the water supply problem since the pressure and volume of the main supply is somewhat restricted.

Large Capacity Reservoir

The works site forms an adequate catchment area from which ample supplies of water for works use may be collected. The reservoir has a capacity of 600,000 gal. and cost about £32,000, which includes pipelines. Since the works were commissioned and started gas-making last November, the total consumption of water in both works per ton of coal carbonised has fallen from an average figure for the year 1954-55 of 397 gal. to 270 gal. per ton, a decrease of nearly 32%. This system of water supply allows the use of town water, costing 253d. per 1,000 gal., to be confined to steam raising, with a considerable saving in cost.

Coal is brought into the works by road or rail. The loaded lorries are tipped direct ontoa shortconveyor belt which transports the coal to the main coal conveyor system. Railborne coal is delivered direct from the colliery in train loads and is marshalled on the works sidings.

These are laid out adjacent to the mainline in 109 lb. flat bottom rail with 95 lb. bull head for the turnouts.

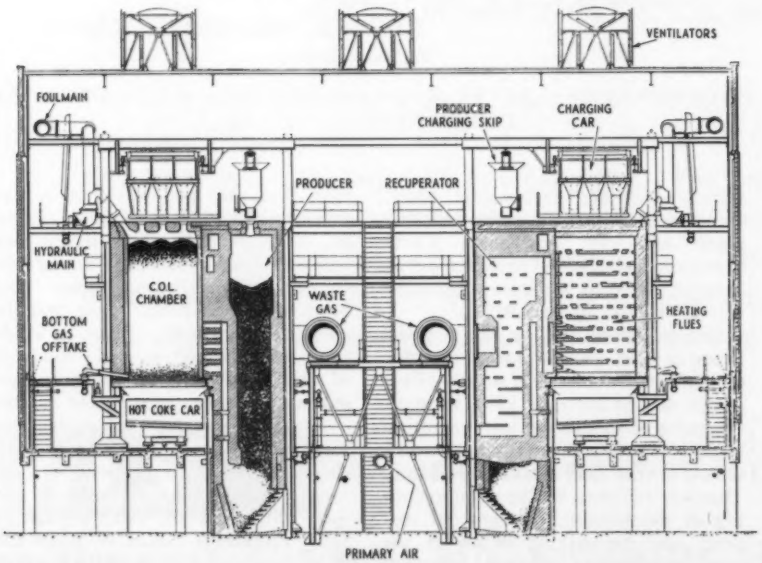


External view of the chamber house, showing the ample windows provided, and the coal and coke bunker building immediately to its right. The generously spaced ancillary plant is noticeable on the extreme right.

The length of the sidings is 4,500 yards and they are capable of holding 135 wagons. The contractors for this work were Grant Lyon & Co., Ltd., of Southampton.

The coal for both the East and the West works enters by these sidings, and since a screened graded coal is needed for the C.V.R. plant in the East works and washed slacks for the I.V.C. plant in the West works, wagons containing these two types of coal must be separated. Those for the East works are marshalled into a special siding and are taken forward to that works' coal handling plant, where they are emptied. The empty wagons are brought back to the West works coke handling plant for coke loading, and so back to the sidings for despatch.

The newly-commissioned coal and coke handling plants and the coal carbonisation plant have been supplied by West's Gas Improvement Co., Ltd., of Miles Platting, Manchester, which has in turn employed a number of sub-contractors to carry out work in which they specialise.



A longitudinal section of the chamber house showing the chamber plant, producers and their respective ancillary equipment. The free space at ground level and the ventilators may be seen (by courtesy of West's Gas Improvement Co., Ltd.).

Wagon Tipplers

Coal wagons are emptied by means of two-side discharge Strachan & Henshaw Rotaside wagon tipplers into a reinforced concrete twin-receiving hopper, each compartment of which can hold 25 tons of coal. Each tippler is provided with an inhaul and outhaul 'beetle' for handling the wagons and is fitted with a photo-electric eye which prevents the wagon being tipped before it is properly in position. The tipplers are equipped with automatic weighers which weigh each wagon twice, before and after tipping.

The control of the tipplers and weigher recording mechanism is centred in a two-storey kiosk from which the operator can have a clear view of what is going on. This equipment can handle 13 25-ton wagons an hour. From the receiving hopper coal is fed by either of two Locker feeders on to twin inclined belt

LOSTOCK HALL WORKS

1. Electricity Sub-Station.
2. Old Meter House.
3. Water Storage Tank.
4. Gas Testing House.
5. Washing Plant.
6. No. 1 Purifiers.
7. Oxide Shed.
8. Station Meter.
9. Underground Tar Storage.
10. Liquor Cooler.
11. Liquor Storage Tanks.
12. Liquor Plant.
13. Stores, Workshops, Offices, etc.
14. Drakes Retort House.
15. Coke Stacking Gantry.
16. Condensers.
17. Coke Screening Plant (Drakes).
18. Road Weighbridge & House.
19. No. 1 Gasholder.
20. Booster House.
21. No. 2 Gasholder.
22. Coke Gantry.
23. No. 2 Purifiers.
24. Oxide Shed.
25. C.W.G. Plant House.
26. Gas Oil Tank.
27. Relief Holder.
28. Loco Shed.
29. Benzole Washer.
30. Benzole Rack Cooler.
31. Meters (I.V.C., C.V.R., C.W.G.).
32. Sigma House.
33. Ammonia Washer.
34. Detarrers.
35. Tar & Liquor Separating Tank
36. Cooling Towers.
37. Twin Waggon Tipplers.
38. Road Coal to Stock Hopper.
39. Transfer Tower (& Crusher).
40. Coal Reclaiming Pit.
41. Coal Stock.
42. Winch House.
43. Oxide Shed (proposed).
44. Tray Purifiers.
45. Junction Tower.
46. Chamber House (C.O.L.).
47. Chamber House (2nd unit).
48. Benzole Plant House.
49. Benzole Tank Compound.
50. Liquor Tank Compound.
51. Liquor Pump House.
52. Coke Reclaiming Hopper.
53. Tar Tank.
54. Effluent Tank.
55. Crude Liquor Tank.
56. Tail Car Track.
57. Coke Screening Plant.
58. Coke Stock.
59. Surface Water Reservoir.
60. Works, Offices, Canteen, Laboratory, First Aid Room.
61. Ablutions.
62. Cycle Racks.
63. Tar & Liquor Loading Bay.
64. Dephenolation Plant.
65. Concentrated Liquor Plant.
66. Breeze Hopper.
67. Water Pump House.
68. Coke Wharf.
69. Coke Wharf (2nd unit).
70. Ash Handling Plant.
71. Drag Scraper.
72. Benzol Loading Bay.

conveyors which in turn discharge coal on to two further belt conveyors at right angles. Here the coal is taken to the crusher house, where it can either pass through the British Jeffrey Diamond Flextooth crusher or be taken direct to coal bunkers in the chamber house. A Pollock coal sampler is fitted to these conveyors so that all coal entering the plant can be sampled. Coal can be stocked or recovered from stock by means of a grab scraper unit, which, complete with tail carriage head post and electric winch, can deal with 130 tons of coal in or out of stock per hour, which is the total handling capacity of the main coal handling plant. The total capacity of the stocking ground is 35,000 tons.

Coal Flow Control

The operator can control the path taken by the coal after being tipped from the wagon and can determine its destination, since all conveyor drives are sequence-interlocked and the control of direction is accomplished by remotely operated flopper gates. To enable conveyor belts to start up when fully loaded, each electric drive is equipped with a Vulcan-Sinclair fluid drive unit. By means of a mimic diagram in the control room in the transfer tower the operator can have full knowledge of which way the coal is flowing and change its direction at a moment's notice. The electric switch gear in the control room allows the operator to switch out the sequence operated automatic belt drive starters in cases of emergency or for testing.

View on the top of a bench showing the top gas offtakes, and the way in which the bench is subdivided into sections of five chambers each.

The belt conveyor system here and for the transport of coke from the chamber house has been manufactured by Naylor Bros., Ltd., Golborne, and the reinforced concrete transfer towers supporting the conveyors by Harbour & General Works Ltd.

The chamber house is a well-designed building of attractive appearance. It is of steel framed construction, with a smooth, flat facade of 9 in. brick work. The type of brick employed is the Rus mixed shade stock which gives a soft, almost weathered appearance. Precast concrete surrounds are used to encase windows and other openings in the walls.

Since this part of the site is largely made ground it was necessary to strengthen the foundations by driving piles. This work was carried out by the Franki Compressed Pile Co., Ltd., and consisted of driving through silty clay down to a very stiff sandy clay with dispersed gravel. For the preparation of the chamber house site which includes a similar area for future extensions, 682 piles, 33 ft. long, were driven. In addition to this a further 83 piles, 38 ft. long, were used in preparing the site for the coke grading plant.

Underneath the coal and coke bunker, the chamber charging car is seen on the left and the producer fuel skip in the centre.

Chamber House

The over-all dimensions of the chamber house are 109 ft. by 88 ft. by about 70 ft. to the spring of the roof. The building is equipped with windows made of glass blocks and consequently they cannot be opened.

To overcome difficulties of ventilation which would result from this, the whole building is supported on piers 13 ft. above the ground. By so doing, there is a free space underneath. Cast iron grids have been placed in the floor of the building which allows air to be drawn in from the free space below. There are three ventilators built in to the roof through which hot air from the chamber benches

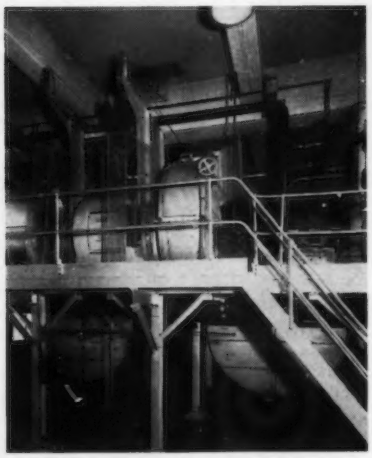
may escape and encourage the circulation of air from below.

There are other advantages to be gained from raising the floor level of the house, including the fact that it provides storage space for such things as refractories, and that the extra height above the foundation level which it provides for the level of the discharge of the chambers, obviates much excavation for the coke quenching plant, coke benches, and the unscreened coke conveyors. To get full advantage from the extra space for storage, the floor at ground level has been concreted. This is purely for convenience since it carries none of the weight of the building which is supported on the piled foundations.

Chamber House Bunkers

Built to the north of the chamber house and in physical contact with it is a reinforced concrete structure which contains the chamber house bunkers and beneath them the available space has been divided into a number of 'rooms' to house the exhausters, switch gear, etc. In this building also are to be found the waste heat boiler plant, men's messroom and other amenities for the shift workers.

The carbonising plant consists of two benches of West's C.O.L. intermittent vertical chambers. Each bench is divided into four settings with five chambers to a setting, making 20 chambers in each bench. The chambers have a total height of 21 ft. 2 in., a major axis of 10 ft. 6½ in. with a minor axis of 7⅞ in. at the top and 12⅝ in. at the bottom of the chamber.



A view of the waste-gas boiler installation.

The total carbonising capacity of both benches is 275 tons of coal a day with a production of 4.2 mill. cu.ft. a day of gas at a c.v. of 525 B.Th.U. a cu.ft.

The centre of the chamber house, between the two benches, up which the ventilating air comes from beneath the building. The two waste-gas mains can be seen.

Each setting is built as an independent unit in that each has its own expansion allowances, and the division walls between settings are provided with internal ducts for air cooling by natural draught. The chambers and the heating flues are constructed of 95% silica material and are built integrally with the recuperators for preheating the secondary air. The recuperators are built of second quality fire brick material.

The discharge outlets from the chambers are sealed by doors made of a special heat resisting alloy steel, which are opened by gravity and closed hydraulically by cylinders situated at the end of each bench. The final tightening of the door is affected by means of eccentric bolts which are manually operated. Should the hydraulic power fail, emergency gear is provided.

Gas Off-takes

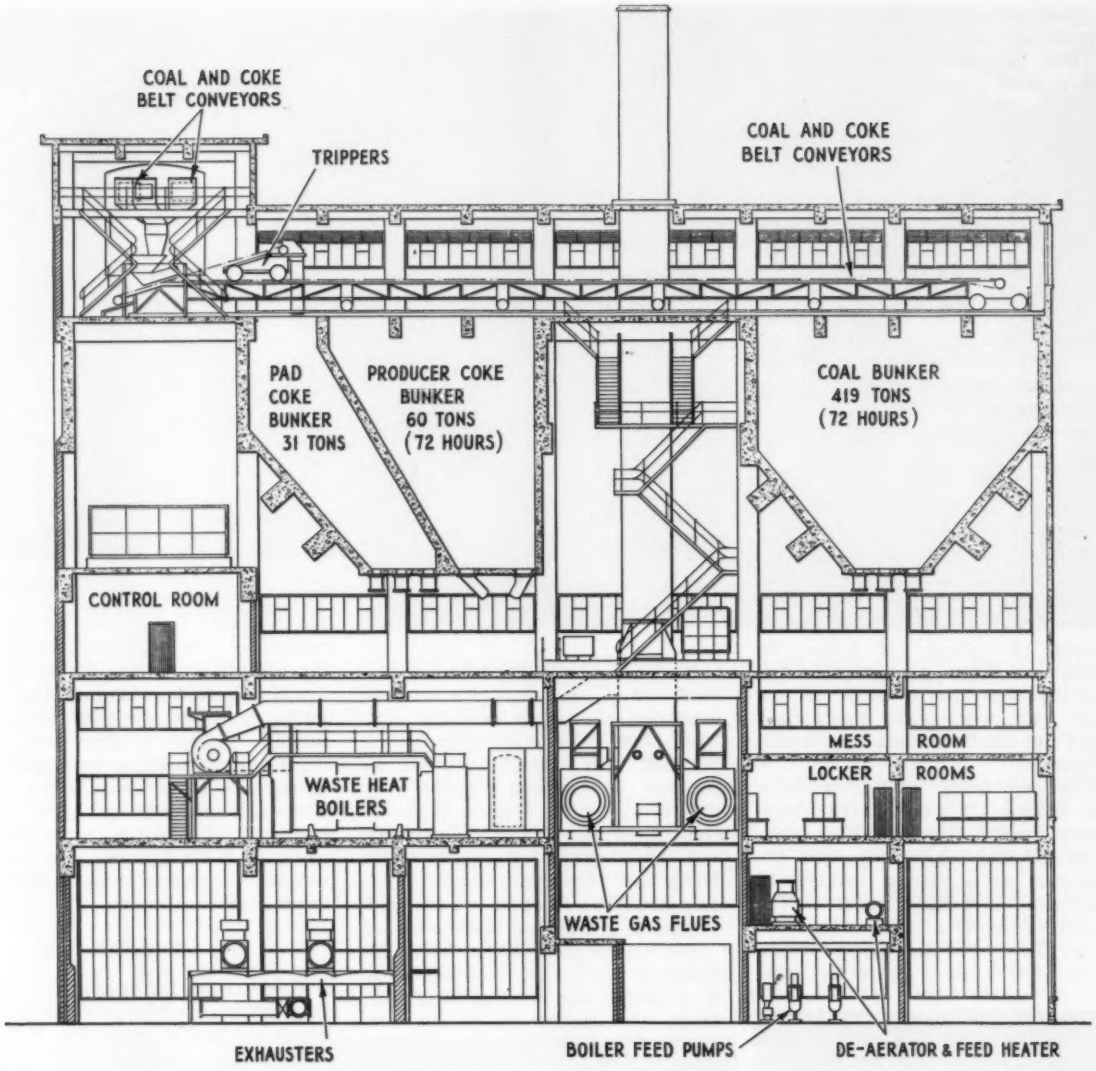
Low pressure steam connections have been made to each door for steaming the charge. Gas off-takes are provided at the top and bottom of the chambers. The top off-takes are lined with refractory material up to the arch pipe, which has the effect of maintaining the gas temperature and reducing the deposits which are normally found at this point with a corresponding reduction in augering. Beyond the arch pipe are liquor-sprayed cup valves leading to a sealed hydraulic main. The gas from these off-takes passes to the foul main. A Bryan-Donkin governor controls the pressure in the hydraulic main.

Gas from the bottom off-takes comes by way of the gas-tar main through slide valves to the gas space in the hydraulic main. Tar and liquor from both the hydraulic main and the bottom off-takes flow to a decanting tank, where the liquor and tar separate. The clean liquor is recirculated to the liquor sprays. Tar is periodically run off to storage and make-up to the liquor system is provided by running off weak liquor from the primary condensers.

Step Grate Producers

Producer gas for heating the setting is provided by step grate producers which are built-in integrally with the recuperators. Each setting is provided with its own independent producers. Primary air is supplied by two electrically-driven fans, one standby, and saturation of the air blast is regulated by thermostatically-controlled valves.

In the reinforced concrete building to the north of the chamber house which has already been referred to, are to be found the coal and coke storage bunkers. These are divided into two main sections, one for each bench. Each section is sub-divided into further divisions of different capacities designed to hold 415 tons of coal, 64 tons of coke for producer fuel and 43 tons of coke to form the protective pad at the bottom of the chamber. These quantities represent 72 hours running of the carbonising plant. Coal is brought to the top of the building by belt conveyor as previously described and the bunkers are filled by means of shuttle belt conveyors. Coke is transported from the coke grading plant in the same way. The bunkers have sloping sides which, together with the bottom sec-



A longitudinal view through the coal, producer fuel and pad-coke bunker building showing the relative positions of the different plant installed in it (by courtesy of West's Gas Improvement Co., Ltd.).

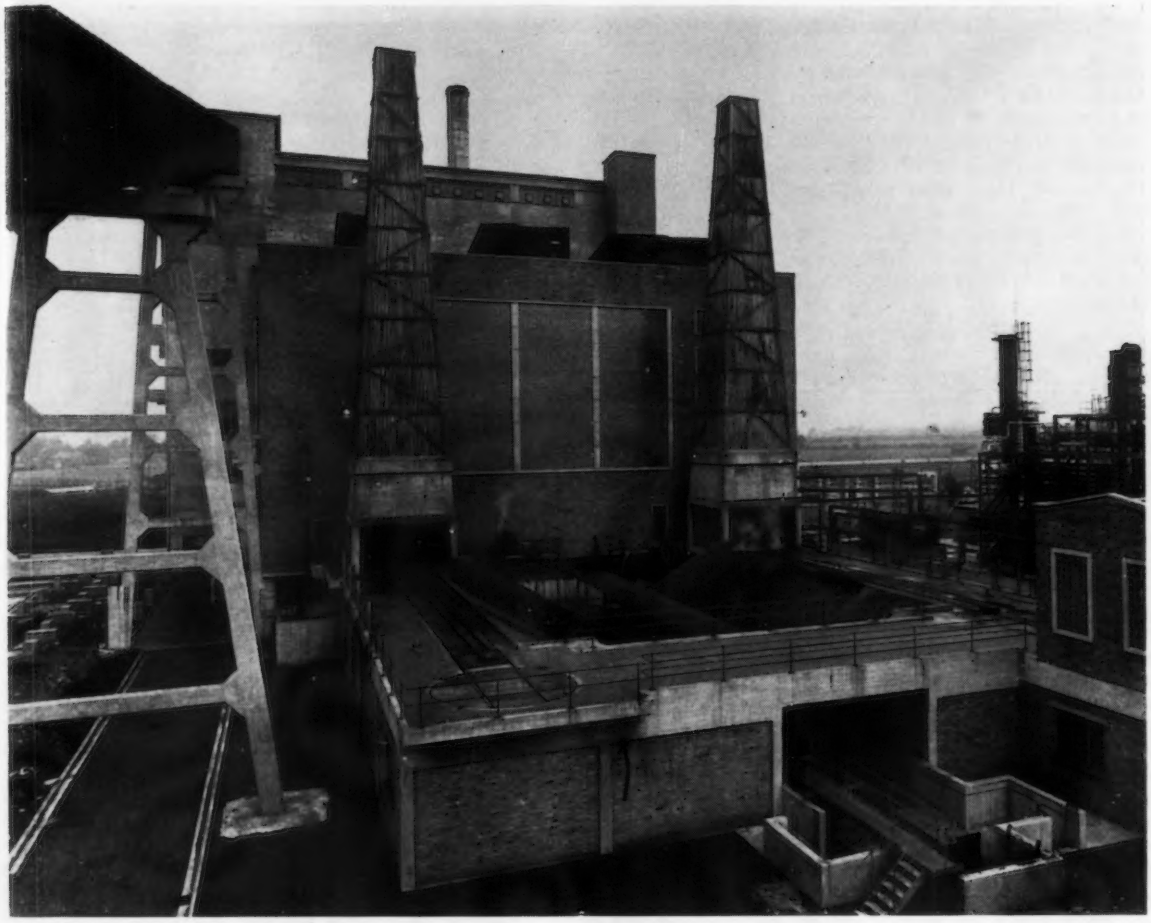
tions, are lined with 1½ in. thick tiles while the vertical surfaces of the coke compartments are lined with Accrington dovetailed tiles of 2 in. thickness. The outlets from the bunkers are lined with cast iron fitments which include quadrant-type gates.

The chambers are charged by a charging car which draws coal and coke from the storage bunkers. It consists of a structural framework carrying two sets of three hoppers which hold the coal and the pad coke. There are three outlets from the charging car which correspond to charging inlets in the top of the chamber. The mouths of these outlets are fitted with telescopic extensions which, when the car is in the correct position for charging, are extended on to the top of the chamber. This forms part of an electrical interlock which prevents the car from being moved until charging is complete and the extensions have been lifted.

The coal hoppers hold enough coal for one charge and the coke hoppers enough for three charges. They are fitted with a device which delivers the correct amount of coke into the chamber to form the pad before charging with coal. The charging car is electrically-propelled and runs on an overhead runaway supported from cross beams at the top of the main buckstays. Each bench is provided with its own charging car and also with its own electrically-propelled coke skip for charging the step grate producers. This also runs on an overhead runaway in which an automatic weigh bridge is incorporated, so that every charge to the producers is weighed and the weight recorded.

The method of running this form of carbonising plant makes it possible to carry out continuous scurfing, that is to say the chamber is left open long enough between emptying and recharging to allow any scurf that might be forming to burn off. No provision for a special scurfing bunker to store the necessary coke need, therefore, be made.

After the carbonising period, the hot coke is discharged into the hot coke car which travels on a track set into the concrete platform under the carbonising chambers. The full car is hauled by its own haulage gear consisting of an endless chain and winch driven through a worm reduction gear and fluid coupling by electric motor The hot coke is taken to a reinforced concrete quenching chamber in which it meets a predetermined quantity of water. This is accomplished by a push-button controlled thruster valve



Exterior of the chamber house showing coke quenching towers, the coke wharfs and the access to the unscreened coke belts and and finger gates.

fitted with an adjustable timing device. Electrically-operated water level control equipment maintains the level in a storage tank and operates recirculating pumps by which the quenching water is recovered.

After quenching the coke is taken to the coke wharf where it is tipped from the car. The tipping mechanism is worked pneumatically and gets its power from a compressed air system along the wharf through detachable flexible hoses. An electrical interlock system prevents the car being moved while it is in the tipped position.

The carbonising plant equipment includes two Spencer-Bonecourt horizontal induced draught waste heat boilers, 9 ft. diameter and 15 ft. 6 in. between the tube plates. Each boiler can handle all the waste gases from both benches with a production of 7,200 lb. of steam an hour at 165 lb. per sq. in. These boilers are equipped with superheaters to give a final steam temperature of 500°F. The induced draught fans are driven by steam turbines, and the arrangement of ducting is such that by means of dampers, either boiler may be worked by either fan in case of emergency. Other equipment installed with the waste heat boiler plant includes a Weir deaerating vessel complete with devapouriser, a steam jet air ejector, an automatic heating steam control valve, and an electrically-driven water extraction pump.

A multiflor surface feed water heater is fitted in the emergency feed water line. The main boiler feed water supply is hot condenser water from the primary gas condensers with a town water emergency supply controlled by a ball float valve.

The pass-out steam from the fan turbines is used for process work in the chamber house, which includes the supply of steam to the chambers and the step grate producers. The waste heat boiler house is situated under the storage bunkers and within easy access of the waste gas flues and the control room. Here there are two main panels, on one of which are mounted instruments controlling the operations in the chamber house itself and on the other, instruments controlling the waste heat boiler operation. The former panel mounts Electroflo instruments and includes recorders for measurement of the suction or pressure at the inlet and the outlet of the chamber house governor and of the exhauster.

There are also indicators showing the state of the water levels in the boiler feed water and quenching water tanks. Steam meters complete with integrators show the consumption of steam at the base of the chambers and in saturating the producer blast.

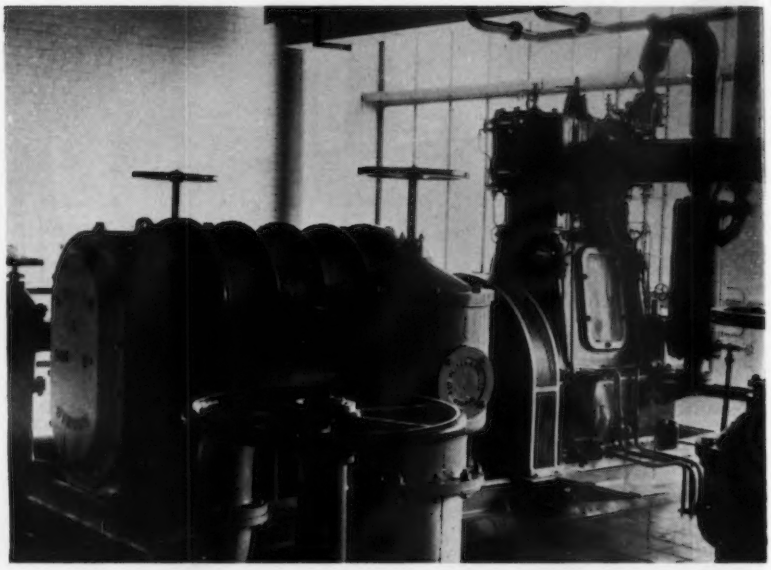
The other panel mounts recording instruments by Thermo-Control, which include a combined instrument measuring the temperature of both the feed water and the superheated steam, the rate of steam flow from the boiler and the percentage of CO_2 in the waste gas entering the boiler. An indicator measures the induced draught at the fan.

At ground level in the storage bunker building are the exhauster room, the electrical switch gear, and the boiler feed pump rooms. In this part of the building, too, are to be found the pumps and accumulator for the hydraulic extractor gear, and the electrical sub-station for the incoming

grid feeder mains and the transformer room. The incoming 11 kV incoming feeder mains are duplicated, and by means of two 750 kVA transformers the power supply to the works is converted to 415V. Since the electrical equipment in the East works is only suitable for D.C. power, rectifiers have been installed and consist of one 230V Hackbridge and Hewittic 125 kW, Mercury arc rectifier and one 230V Nevelin 150 kW Mercury arc rectifier.

Since turbo-alternators for the generation of waste heat steam have not been installed, the grid mains are the chief source of electric power, and to provide standby generating equipment in case of emergency, a 310 kW six-cyinder diesel set by the English Electric Co., Ltd., has been installed, which can also supply peak load power when needed. The D.C. emergency supply is generated by existing equipment in the East works. In the diesel generator room has been installed the low voltage switch gear supplying and controlling the power to all parts of the West works. This is all manufactured by E.E.C. and is of their 'Superform' fused type of switch gear.

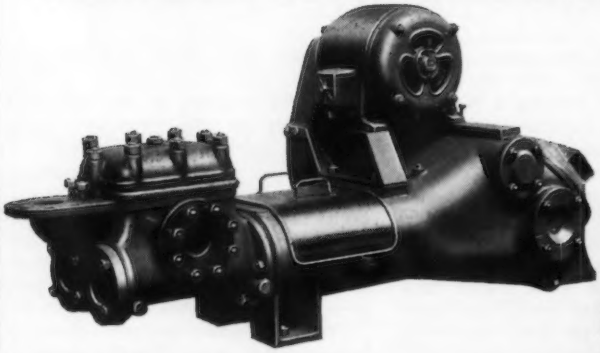
The diesel generator set comprises an E.E.C. 6 kW diesel engine of 450 B.H.P. (B.S.S. 12-hour rating) direct coupled to an E.E.C. salient pole type alternator. The output from this set on full load at 750 r.p.m. is 310 kW, 387 kVA at .8 power factor, of 415V 50 cycles, 3-phase alternating current. Ancillary equipment consists of a forced draught water cooling tower, water pump cooling for the engine and compresed air starting equipment. A motor-driven fuel transfer pump with a semi-rotary hand pump as a standby is also included.



One of the Roots type Waller exhausters, driven by a Bellis and Morcom steam engine (by courtesy of George Waller & Son, Ltd.).

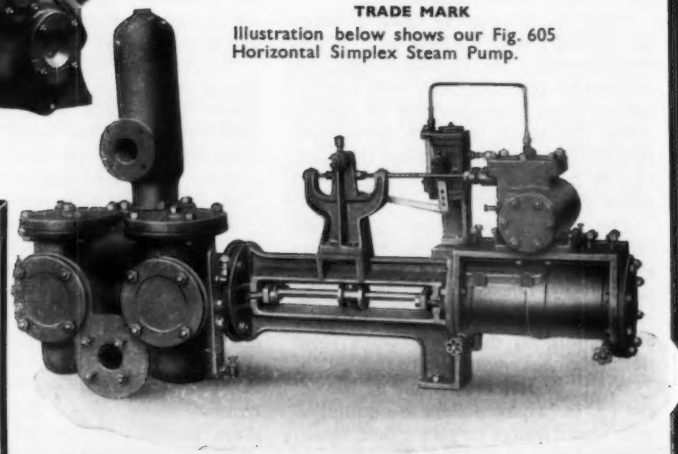
From the chamber house the gas is brought by a 24 in. M.S. main to two mild steel vertical water tube condensers, supplied by Robert Dempster

PUMPS FOR THE GAS INDUSTRY



TRADE MARK

Illustration below shows our Fig. 605 Horizontal Simplex Steam Pump.



POWER OPERATED

Above illustration shows our Fig. 679 Horizontal Totally Enclosed Duplex Power Pump. As supplied to North Western Gas Board Preston Installation.

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IN ASSOCIATION WITH PULSOMETER ENG. CO. LTD. READING

AND STEAM OPERATED

Ltd. of Elland, and situated on the west side of the building. These condensers, working in series, are designed to cool 180,000 cu.ft. of coal gas per hour from 175°F. (saturated) to 60°F., using recirculated water in the first taker and part recirculated and part town water in the second taker. The gas flow, as normal, is counter-current to the water flow while hot boiler-feed water is withdrawn from the water system at the first taker. At the inlet of the recirculating water main there is a 4-in. diameter Arca double-beat type valve which, under the control of a thermo-relay in the gas outlet main, maintains the temperature of the outlet gas to the exhausters by modifying the flow of recirculating water.

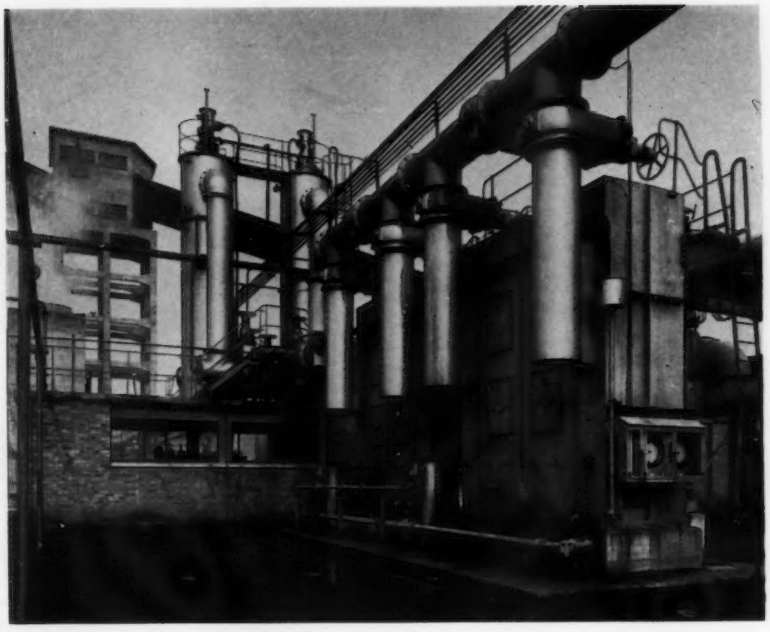
Exhausters

There are two steam driven Waller Roots exhausters—one standby—each with a capacity of 180,000 cu.ft. per hour at an inlet pressure of 6 in. W.G. and an out pressure of 48 in. W.G. They are driven by Bellis & Morcom, two-crank, compound, 'C' type vertical enclosed steam engines, operating on superheated steam at 140 lb. per sq. in. at a temperature of 550°F. and develop 40 B.H.P. at 380 R.P.M. The engine is directly coupled through a flexible drive arranged in the fly wheel to the exhauster. The exhaust steam from the engine which passes into a low pressure steam main at 15 lb. per sq. in. is used for process work.

From the exhausters the gas passes to the detarrers. These are by Whessoe-Woodall-Duckham and consist of two identical units—one a standby—each capable of handling 180,000 cu.ft. per hour. They are of the tubular type, 5 ft. by 28 ft. high and can extract the tar fog from the gas with an efficiency of 99.5 ± .5%. They are placed on the roof of the high tension house in which the transformer rectifier unit and ancillary electrical gear are installed.

Ammonia Washers

The ammonia washers are two Multifilm static washers by W. C. Holmes Ltd., each of which consists of six washing chambers filled with special brush filling. Waste liquor cooled to 60°F. is used as the washing medium at the rate of 100 gal. per hour and will reduce the ammonia content of the gas to two grains per 100 cu. ft. From the outlet of the ammonia washers the gas passes by the 24-in. diameter main via a Holmes-Connersville meter to the dry purification plant. At this point the two gas streams from the Drake's C.V.R. plant at East works and the carburetted water gas plant respectively converge and, after being measured, each stream by its respective Holmes-Connersville meter, the three streams blend and go forward as a single stream.



A view of the Whessoe-W.D. detarrers and the Holmes ammonia washers.

At the outlet of the blending point there are two alternative routes, one a 24 in. diameter connection to the old purifiers, the other through a 36 in. diameter main to the new tray purifier plant by R. & J. Dempster Ltd., of Manchester. These purifiers are designed as a five-box set, each box 45 ft. 9 in. by 31 ft. 6 in. by 13 ft. 8 in. deep, in line, and as a complete unit, with the individual boxes formed by division plates.

Tray Purifiers

In each box are 18 oxide trays and a spare set of 18 trays are provided for filling with fresh oxide in readiness for changing any box. The trays are 13 ft. 6 in. square by 3 ft. 10 in. deep with a central gas way of 12 in. inside diameter. At the top and bottom of this gas way are machined flanges grooved to take rubber jointing rings, which form a gas tight joint between trays.

The oxide is placed on two tiers of wood grids on the trays and the flow of gas to the boxes is regulated at the inlet and the outlet by 36-in. diameter Cort's lubricated Townrow valves. Low pressure steam connections are provided at each box and a gas heater at the inlet to the purifiers.

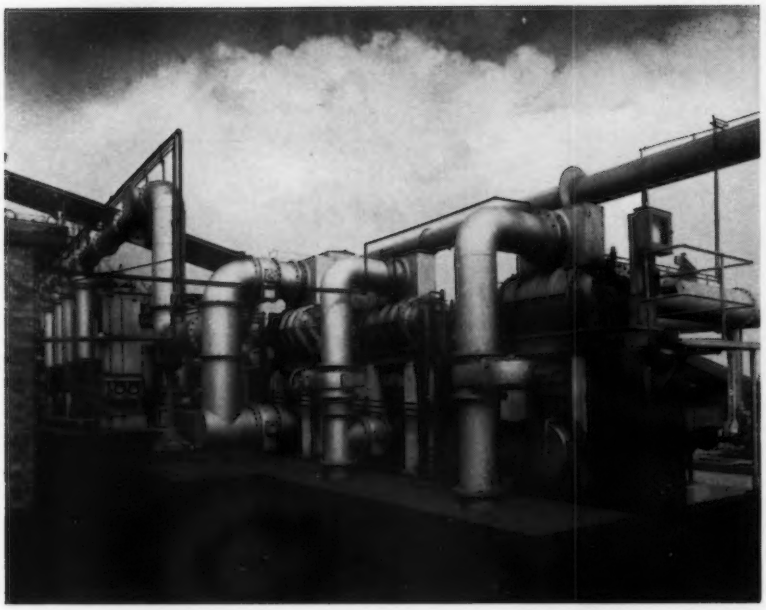
The trays are handled by an electrically-driven Goliath crane which runs on an overhead gantry. This gantry runs far enough beyond the boxes to allow the trays from any one purifier to be emptied and refilled trays to be quickly and easily picked up and placed in the empty box. Under these conditions a box can be changed and be back in service in a working day.

Benzole Washers

From the tray purifiers the gas passes to the benzole washers, which consist of two of W. C. Holmes & Co. Ltd.'s Multifilm static benzole washers, which will operate under a maximum throughout of 500,000 cu. ft. per hour and at full load will recover 85% of benzole in the gas. At the same time, the plant will extract up to 40% of removable organic sulphur compounds, dependent on the relative proportions of the four main constituents. The gas then proceeds through the 30-in. main to the works station meter or a proportion may be diverted by an existing 24-in. diameter main to the works outlet main.

The works Holmes-Connersville station meter which has just been installed as part of the present project has a capacity of 19.2 mill. cu.ft. per day and is complete with indicating and recording gear to accurately measure all gas sent out from the works.

The benzolised oil from the washing plant is pumped to the crude benzole stripping plant which is of the vacuum type manufactured by W. C. Holmes & Co., Ltd. This plant can deal with the benzole from the maxi-



The three Holmes-Connersville works meters, measuring the gas productions in each stream.

mum throughput of 11 mill. cu.ft. of gas per day and can strip up to 4,500 gal. of oil per hour at the rate of 3.5 gal. per ton of coal carbonised. The spent oil is returned to the benzole washers.

All liquor is collected in a central crude liquor storage tank, constructed of cast iron and supplied by R. & J. Dempster Ltd. From this tank, crude liquor is pumped to the effluent plant. This is divided into two main sections. First, the liquor enters the dephenolating plant, where it is washed with benzole and the monohydric phenols are removed. These are later recovered by caustic washing. The dephenolated liquor is then treated in a Holmes concentrated ammonia liquor plant where it is stripped of free ammonia, carbon dioxide and hydrogen sulphide. The plant produces a concentrated ammonia solution of 20-22% w/w. of free ammonia and has a maximum productive capacity of 1,600 gal. per hour from a crude liquor containing 1.5% of free amonia.

Liquor Disposal

The spent liquor is pumped to a storage tank on the west side of the chamber house. From here it is pumped down to a disposal station on the estuary of the River Ribble. By means of electrically-operated tide clocks, outlet valves at this point open automatically at the turn of the tide, to discharge the liquor on the ebb tide and close again before low water.

The control of the calorific value of the gas made in the combined East and West works, together with that being distributed from the holders, might be something of a problem with the distances involved in a works layout such as this. The difficulties have been overcome by building a centralised calorimeter house in the neighbourhood of the works meters. Since all three gas streams converge near this point, sampling tubes of reasonable length can connect with Sigma recording calorimeters, and by this means a continuous record can be kept of the calorific value of the gas flowing through each stream.

A Sigma telemetric indicator connected to a Sigma recorder placed near the station meter measures the calorific value of the gas entering the holder and conveys the information to this point. In this way a continuous record can be kept of the volume and calorific value of gas being produced in each stream, as well as the total volume of gas leaving the station and its calorific value.

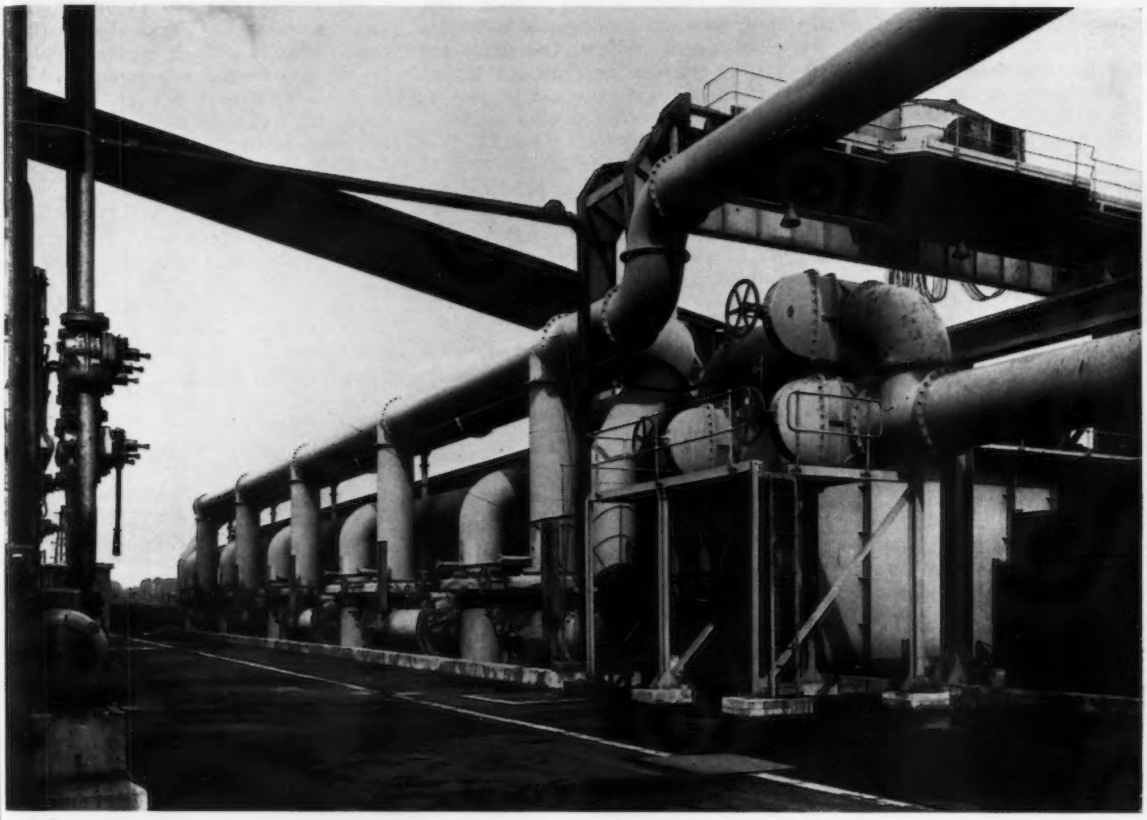
In the Sigma house, too, there is a Boys calorimeter for calibrating the recorders. The official Fairweather instrument is situated near the booster outlet main.

Hot Coke Cars

The coke from the chamber house is brought out to the coke wharf by the hot coke car, and tipped onto the coke benches as already described. Each bench of chambers has its own coke handling equipment which is worked independently, and by means of extended tracks and turn tables the hot coke cars can be changed and taken to the garage for repairs. These cars were supplied by Wellman, Smith, Owen & Co., Ltd.

Each wharf is provided with finger gates which control the discharge of coke onto the wharf conveyor belt of toughened rubber, by which it is taken to a transfer tower at the south-west corner of the chamber house and discharged into a trifurcated chute. From this chute coke can be diverted to one of two inclined conveyors to the screening plant or to road vehicles for outside storage. The capacity of the belt conveyor system bringing coke to the screening plant is 40 tons per hour and like the coal handling system is controlled from a central point at the coke handling plant. Here, by means of remotely controlled sequence operated switch gear, the operator

The exterior of the C.W.G. plant showing the detarrer to the right and the water coolers to the left.



The R. & J. Dempster tray-purifier plant. The 'goliath' crane for use when changing trays is seen above.

with the help of a mimic diagram can decide in which direction coke is to be conveyed, either rough coke from the chamber house for screening or external storage or No. 4 coke to be returned to the chamber house for filling the producer fuel and pad coal bunkers.

Coke Screening Plant

The coke screening plant was supplied by Robert Cort & Son Ltd. and consists of two lines of screening and cutting equipment. Each line is identical and is made up of a Cort's single deck scalping screen which removes all coke over 2 in., and grading screens arranged over the storage bunkers. These screens give the following sizes: 0 to ⅜ in., ⅜ in. to ½ in., ½ in. to 1¼ in. and 1¼ in. to 2 in. The coke over 2 in., which has been separated by scalping screens, is taken to coke cutters where it is reduced in size and subsequently taken to the grading screens for sizing.

The coke handling plant including the storage bunkers is made of reinforced concrete. The total storage capacity is 850 tons, divided up into 2 in. and over, 210 tons, 1¼ in. to 2 in., 260 tons in two compartments, ¾ in. to 1¼ in., 145 tons, ⅜ in. to ¾ in., 125 tons, and below ⅜ in. 110 tons. Each bunker is lined with 2-in. thick Accrington tiles, and is self emptying.

At the base of the coke storage bunkers debreezing screens are provided and coke free of breeze can be bulk loaded in to lorries or railway wagons, or can be transported by belt conveyor back to the chamber house bunkers. Any grading can be used for this purpose, but that most commonly made use of is the No. 4 grade. The capacity of this conveyor is 60 tons an hour. Coke may be bagged by means of the Simon automatic weighing and bagging machines which travel throughout the length of the bunkers. Platforms are provided for stacking the full bags which assists in the loading of lorries. Breeze from the debreezerers is collected by a horizontal conveyor belt and is discharged at the rate of 15 tons an hour into a reinforced concrete bunker well away from the coke storage bunkers.

Switchgear

From these breeze bunkers either lorries or railway wagons may be loaded. All switchgear for this and the coal handling plant was supplied by Allen West & Co., Ltd., and wiring has been carried out by W. H. Smith & Co., Ltd. All electric drives are fitted with Vulcan-Sinclair fluid drives and are sequence interlocked. Before any motors driving either conveyor belts or screens are started a warning Klaxon is sounded.

In the present project is also included the installing of a third water gas unit. This consists of a 1.6 mill. cu.ft. per day at 450 B.Th.U. per cu.ft., completely automatic unit using ½ in. to 1 in. coke, and incorporates the new type of carburettor suitable suitable for gasifying heavy oil. If a large grading of coke is used, the output from this unit may be increased and all ancillary equipment is large enough to deal with a gas make of 1.75 mill. cu.ft. per day.

Avoiding Tar Emulsions

To reduce the possibility of the formation of tar emulsions as far as possible, an elevated cone based primary washer and a hot electrostatic detarrer have been installed in place of the ordinary washer and condenser. In addition a secondary clean water circulating and cooling system has been installed. It is proposed to use the two old units for the production of blue water gas as a diluent and the third unit for CWG production when required, and confine carburation to the use of heavy oil. Blue water gas may also be made in the new unit,

which may be a convenient way of disposing of surplus stocks of small coke.

With the completion of this plant the total capacity of this works becomes 14 mill. cu.ft. per day, with 1½ mill. cu.ft. per day of CWG plant as a standby for times of peak load or emergency.

Ample storage is provided throughout the works for liquid products. In addition to the cast iron storage tank for the storage of crude liquor already referred to, a large spent liquor tank of mild steel, constructed by the North Western Gas Board itself and a mild steel tank supplied by Whessoe Ltd., of Darlington, are all centred in the open space to the west of the retort house. There is also a small tank farm near the concentrated ammonia plant which contains the tanks for storing benzole, concentrated liquor, and caustic soda for use in the recovery of benzole from the dephenolating plant. Pumps for handling tar and liquor are the totally-enclosed Duplex type supplied by Joseph Evans Ltd.

The steel work throughout the I.V.C. plant has been treated with paint supplied by Donald Macpherson Co. Ltd. of Manchester. The types used include 'Foochow' blue lead anti-corrosive undercoat, heat resisting aluminium paint and finishing grades. The black bitumen paints have also been supplied by this firm.

To complete the new extensions, a new administration block has been built. This is a single storied building of steel framed construction with brick walls. Robertson's 'Q' decking has been used for the roof. This block has been divided up into two main sections; the canteen, with separate accommodation for the staff and equipped with the most up-to-date gas cooking appliances, and the administrative section, which includes the Station Engineer's and his assistant's offices and the work laboratories for plant control.

The new works give a feeling of spaciousness, which is accentuated by the broad roads which have been laid out as part of this project.

Crane Drivers' Work Cut To Minimum

TRADE NEWS SUPPLEMENT

MANŒUVRABILITY and precision in load placing was the theme of the demonstration of Coles cranes shown to members of the gas and water industries at the Crown Works of Steels Engineering Products Ltd. of Sunderland recently.

To attain such perfection as these cranes exhibited, driver fatigue and the abandoning of safety precautions would be far too high a price to pay. The system of torque conversion used and the fitting of limit switches takes away all external distractions and allows the driver solely to concentrate on operating the crane.

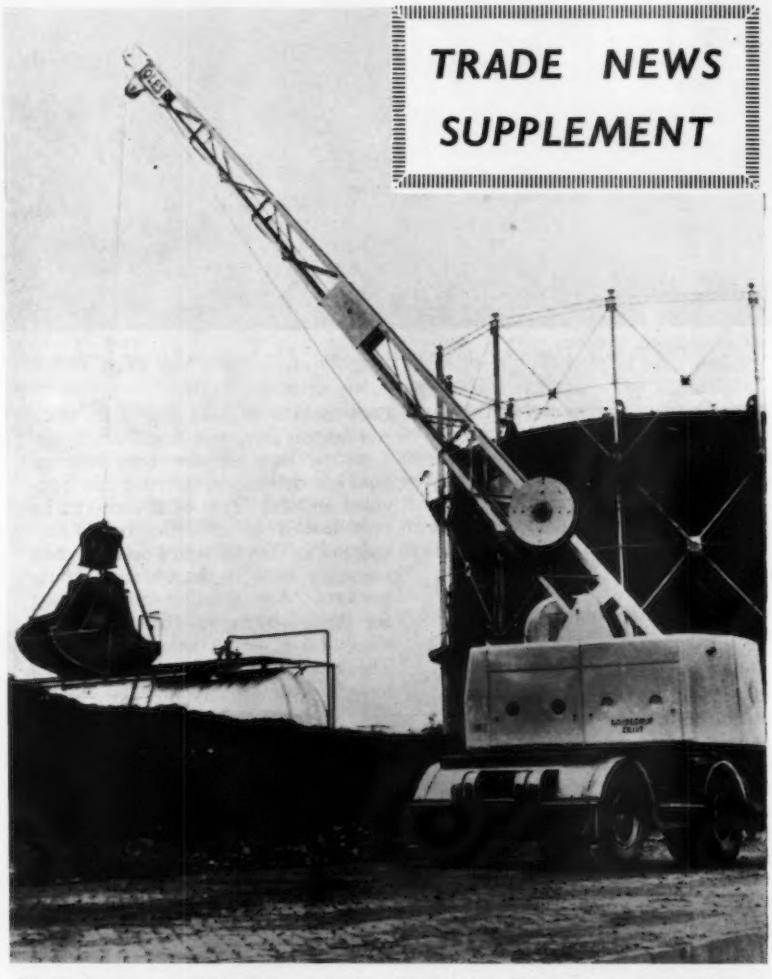
Diesel Engine

Steels Engineering Products Ltd., claim to have discarded all other forms of crane drive, including the mechanical linkages and hydraulic motors, in favour of a diesel (or petrol) electric system of power production and transmission.

To make this possible, the system contains a suitably powered diesel engine directly coupled to a variable voltage generator. Each of the crane operations, travelling, lifting, slewing and jibbing are carried out by a separate variable voltage motor, directly connected electrically to the generator through suitable contactor gear. The speed of the operating motors will be directly proportional to the speed of the generator, the speed of which will depend on the speed of the diesel engine. Thus the only speed control needed by the crane driver is his foot accelerator.

By using electrical transmission in this way, the firm claims to have found the most satisfactory torque convertor, by means of which the crane driver has perfect control of his load at all speeds and can change his speed from the maximum to the minimum without any unevenness or snatching of the load.

Safety devices are applied to the maximum jib radius for which loads of various sizes can be safely handled and also the minimum radius to which the jib may be elevated. This is accomplished by means of limit-switches included in the design of the jibbing gear and depends on the use of micro-switches.



The Coles crane, model S810 equipped with grab, handling coal on the premises of the municipal gasworks, Zeist, Holland.

Since a number of cranes in the Coles range have provision for extending the jib, means must be incorporated for adjusting the micro-switches accordingly. This is done by the simple adjustment

Continued on p. 628.

A general view of Calder Hall A atomic power station.

The Future of

NUCLEAR POWER

by J. V. Dunworth, C.B.E., M.A., Ph.D.

Head of Reactor Division, Research Group, U.K.A.E.A.

THERE are so many occasions these days on which a paper of this general nature is given that it has become quite impossible to be original except on rare occasions. No further apology will be made for using a number of recent articles and reports as the basis for the present paper. They are the annual reports of the United Kingdom Atomic Energy Authority, the Government White Paper on Nuclear Power which was published about two and a half years ago, a paper which was presented to the World Power Conference in Vienna last summer, the United States Congressional McKinney Report and one or two recent statements on current developments.

There are many possible uses for the nuclear heat which is obtained from a reactor and these can be met from a wide range of different types of reactors based on different technologies. However for optimum economic performance it may well be that one particular type of reactor technology will eventually prove superior to any other type for some particular use. An entirely different type of reactor technology may be the correct basis for an alternative application. One has then the pattern of studying various different types of reactor on a research basis in order to acquire an understanding of their basic technology. In parallel, one considers the various possible applications and assesses for each the usefulness of a given type of technology, the development effort required, and the time scale. These matters are elementary but frequently overlooked.

The British White Paper on Nuclear Energy published early in 1955 represented the first co-ordinated statement in the world on an economic nuclear power programme for civil use. It was based on conditions in the U.K. and recommended that the U.K. should concentrate initially on developing a large nuclear power electrical generating station. This arose partly from the fact that it seemed likely that this was the first application where nuclear power would be economical. Secondly, the greatest economic gain would accrue to this country from such a development because this country is dependent on fuel imports and these imports will increase rapidly over the next 10-20 years. If our electricity can be provided from nuclear power, and the use of electricity can be extended to replace the direct use of conventional fuels, as in railway transport, then the U.K. will save substantial quantities of foreign exchange if nuclear power is developed and fuel imports minimised as a result. The cost of importing

nuclear fuel is less than that of importing conventional fuel.

The British White Paper[1] was a fairly conservative document and envisaged the development of nuclear power in three stages. Stage 1 was to consist of the comparatively simple gas cooled graphite moderated Calder Hall type of reactor, and it was envisaged that we should proceed fairly quickly to a Stage II in which one still retained the concept of a solid fuel element and a separate coolant. The coolant was to be a liquid rather than a gas in order to obtain better heat transfer conditions. It was believed that this would result in obtaining much more heat from a given size of system and thereby reduce significantly the capital cost per installed electrical kilowatt of the power station.

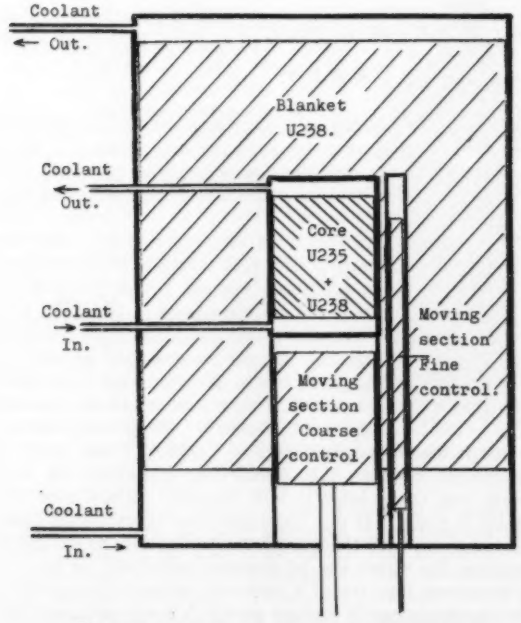
Programme Increased

Within the last two years, however, the gas cooled graphite moderated system has shown much greater potentialities than was anticipated and the third United Kingdom Atomic Energy Authority annual report[2] explains that this has had two consequences. First, the programme of nuclear power has been significantly increased as was announced recently by the Minister of Power. The original programme called for between 1½ mill. and 2 mill. kilowatts of installed capacity by 1965, with Calder Hall type twin reactor power stations each generating between 100,000 and 150,000 kilowatts of electricity. It now seems that twin reactor stations can each deliver at least 500,000 kilowatts of electricity, and the revised programme is for 5 mill. to 6 mill. kilowatts of installed capacity by 1965. Secondly, it is made clear in the recent Authority report that the choice of a Stage II reactor system to follow the Calder Hall type of reactor has become much more difficult since it has now to face much stiffer competition from Stage I reactors. As a result the concept of three successive stages has been modified. An alternative way of putting this would be to say that Stage I has merged into Stage II, although an alternative type of reactor may still be developed using solid fuel elements and liquid or gas cooling. Stage III, however, does remain as an entirely separate group of reactors. They consist of a fast reactor, and of those thermal systems where the fuel is either in suspension or in solution and not necessarily separated from the coolant.

Zero energy fast reactor 'Zeus' showing core surrounded by breeding blanket.

The Stage II reactor systems which were referred to in previous Authority reports were the sodium graphite system[3] and the pressurised water system. The latter is of the same general type as that which the United States has adopted for its first large scale power station, at Shippingport (near Pittsburgh)[4]. This latter is due to be commissioned about the end of this year.

The third Authority annual report makes it clear that the Authority has modified its plans for a sodium cooled graphite moderated system and at the moment it is not decided whether this system will acually be built in the near future. However, work has been proceeding on a pressurised water reactor for submarine propulsion and it has been announced that a land based prototype will be built at Dounreay in the North of Scotland. A nuclear propelled submarine is to be built also, and will be named Dreadnought.



Diagrammatic representation of fast reactor.

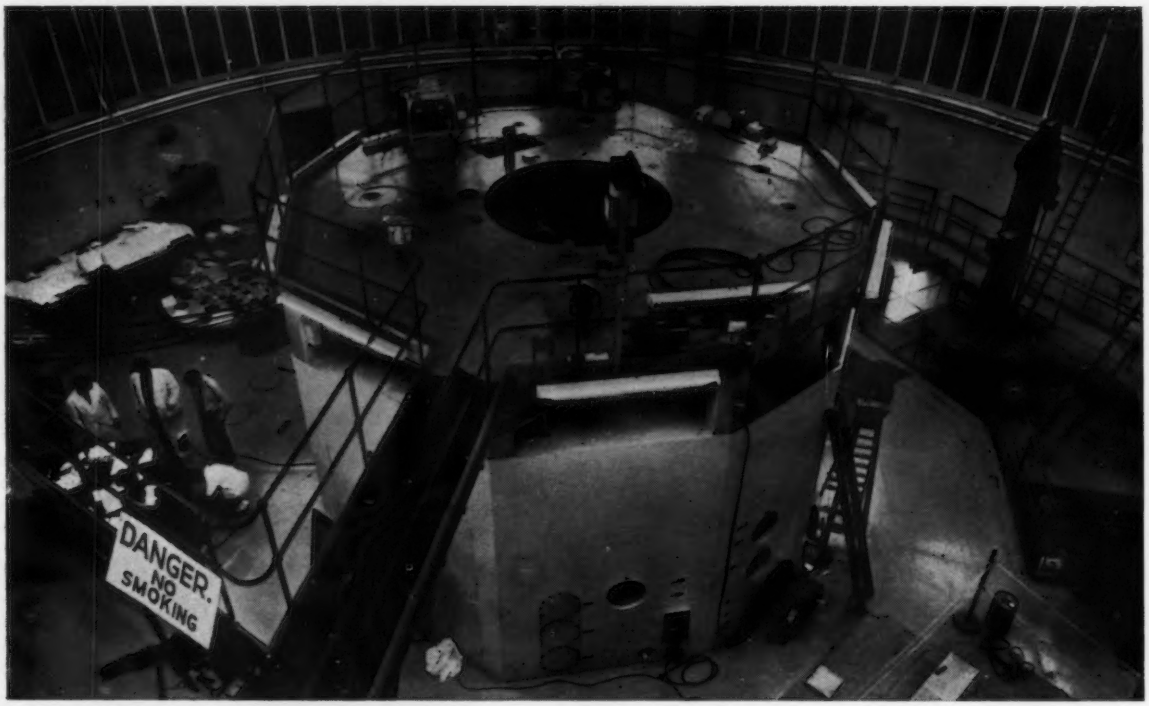
Severe Restriction

It is perhaps more easy to visualise the possible reactors for Stage I and II by reference to the following table which I have used on a number of previous occasions.

Moderator	Be	C	D	H
Coolant				
Gas	c	a	b	d
Heavy water	d	d	c	d
Light water or alternative liquid	d	d	d	b
Sodium	b	b	c	d

A system which might well go ahead now ... ... a
Distinctly possible type of system ... ... b
Not a very likely system at present c
Not a likely system ... ... d

It will be noted that I suggest that the coolant can be molten sodium, a gas, heavy water, ordinary water or some alternative liquid containing light hydrogen atoms. There are other possible liquids but for economic reasons none of these seems particularly attractive in a reactor.



Above: *Research reactor 'Dido' newly commissioned at Harwell.*
Left: *'Coffin' for unloading highly radioactive spent fuel elements from reactor 'Dido.'*

A very severe restriction arises from the fact that the liquid must not absorb neutrons strongly.

The alternative light hydrogen containing liquid to which I refer in the table is a hydrocarbon. From the radiation stability point of view, the most suitable materials are those based on benzene rings and diphenyl and terphenyl have been regarded as an obvious choice[5], though other possibilities do exist.

There are four possible moderating atoms for a thermal reactor, the light hydrogen atom, the heavy hydrogen atom, carbon, and beryllium. The light hydrogen atom can be used in the form of ordinary water or an organic liquid. There are other possibilities such as molten caustic soda for specialised uses, but no economically acceptable one has appeared so far for use in a large civil power reactor. Heavy hydrogen atom can be used only in the form of heavy water. In the case of any other compound containing heavy hydrogen, radiation breaks the material up at a very rapid rate and the cost of recovering the valuable heavy hydrogen and reforming the moderator material has so far appeared quite prohibitive. The most obvious way of using carbon as a moderator is in the form of graphite and no satisfactory alternative has so far appeared. The beryllium atom can be used either in the form of metal or oxide. Since beryllia is much cheaper than beryllium metal it seems likely that the first application in a large scale civil reactor will involve the use of beryllia.

One has therefore 16 basic types of reactor though there are alternative materials if it is decided to use the light hydrogen atom. This article will not go into details of the arguments for and against each of the alternatives, except to draw attention to the fact that the reactors listed cover all Stage I and Stage II systems which have been considered in the U.K., and that they cover all those reactors which are likely to be used on a commercial

basis anywhere in the world within the next ten years. Only four reactors are regarded as either distinctly possible or systems which might go ahead fairly immediately, and all of these have either been studied or looked at quite seriously in the U.K. The U.K. has developed the gas-cooled graphite system[6], while the United States has developed the pressurised water system[4,7]. The other two are in an early stage of development for large scale civil use in the United States and are being studied in the U.K.

There are certain variants on the pressurised water system. Cooling the reactor can be carried out either by using the water at very high pressure, or alternatively by allowing the water to boil in the reactor system[8]. In the latter case it is possible to use the steam obtained from the reactor directly to drive a turbine. Alternatively a heat exchanger can be interposed. The United States has commissioned recently a small experimental boiling reactor (EBWR) giving about 5,000 kilowatts of electricity. In the case of a pressurised water system it is essential of course to interpose a heat exchanger. It is possible to envisage some form of two phase coolant system, but this type of work is very much in its infancy.

Quest for Alternative

Uranium metal is a very curious substance metallurgically and unfortunately none of the alloying additions which would transform it in to a satisfactory material are acceptable on nuclear grounds. Furthermore uranium metal is readily attacked by pressurised water and gaseous coolants. In consequence serious consideration has been given to some alternative form of uranium fuel element and, for the various reactors listed, research is directed mainly to the use of uranium oxide, though some consideration has been given to the possible use of uranium carbide.

If present promise is fulfilled, then a gradual change seems likely to take place from metal to oxide. It is a characteristic of a Stage I and Stage II reactor that the coolant circuit is not normally contaminated with fission products arising from the uranium fuel. Furthermore, it is desirable that normally there shall be no corrosion of the fuel by the coolant. This implies a barrier material and in the case of Calder Hall piles of magnesium alloy known as Magnox has been developed for canning the uranium metal bars. A zirconium tin alloy has been developed in the United States, known as Zircalloy 11, and is extremely resistant to attack by pressurised water. It is important, however, that if the canning should fail, the nuclear fuel should be corroded only slowly by the coolant so that ample warning is obtained before a faulty fuel element has to be removed. This is a point which must be borne in mind in selection of coolant and the form of uranium fuel employed.

In the background the twin 300 ft. cooling towers, No. 1 reactor and the turbine hall of Calder Hall A generating unit. In the foreground the C.E.A. sub-station that links Calder Hall to the national grid.

A further point for consideration is the type of fuel cycle which can be employed in a reactor of the Stage I and Stage II type. The Calder Hall reactor has the great advantage that it can operate on cheap natural uranium fuel and the only processing needed for this fuel is the comparatively conventional chemical one. Under these conditions only about ½% of the total uranium in the fuel is actually consumed before the fuel has to be discarded. This discarded fuel, however, contains plutonium and it is possible to extract more heat from the residual uranium provided that the plutonium is returned to the reactor, together with a fraction of the original partially used uranium plus some fresh uranium. The details of this fuel cycle are rather complex and are dealt with in World Power Conference Papers [9,10]. However, even under the best circumstances, the total fraction of the fuel which can be consumed is not likely to exceed a few percent. An alternative potential fuel is thorium, since, when thorium is placed in a pile, it is changed gradually into a nuclear fuel, uranium 233[11]. When this latter fuel is consumed in a thermal reactor enough spare neutrons are produced to change an amount of thorium into uranium 233 which is roughly equivalent to that which has been consumed. As a result, it is possible to envisage that in most of the reactor systems referred to earlier, 100% of the thorium feed could be consumed once the process has been started off with a supply of either plutonium or uranium 235. Uranium 235 is obtained from a diffusion plant and is a fairly expensive fuel. Once again the reader is referred to more detailed papers.

Experimental System

The earliest Stage III reactor considered in the U.K. was a fast reactor and an experimental system is now nearing completion at Dounreay in the North of Scotland[12]. This system can produce as much plutonium as is consumed and if appropriately designed it can produce a substantial surplus. Consequently it is possible to burn all the atoms in ordinary natural uranium, and the fast reactor system represents a great advance in this respect over Stage I and Stage II thermal reactors. The introduction of diluting materials into a fast reactor tends to slow neutrons down and spoil the nuclear characteristics of the reactor. In the absence of dilution, however, it is not easy to secure an adequate rate of heat release from the fuel which is invested in the reactor system.

The Dounreay reactor system makes use of a solid fuel element cooled by molten sodium and a further major problem is to secure a reasonable burn-up of the fuel elements before they have to be reprocessed because of metallurgical damage. In a thermal reactor it is possible to obtain a high burn-up by diluting the fuel but in the case of the fast reactor this is not possible to anything like the same extent. One has, therefore, to process the fuel many times before it is finally consumed and this is liable to lead to expensive overall fuel costs. (The basic cost of nuclear fuel is negligible.)

The other types of Stage III reactor system which are under consideration are thermal reactors. One general type makes use of solutions or slurries of fuel either in pressurised water or in liquid metals, or infused salts. One

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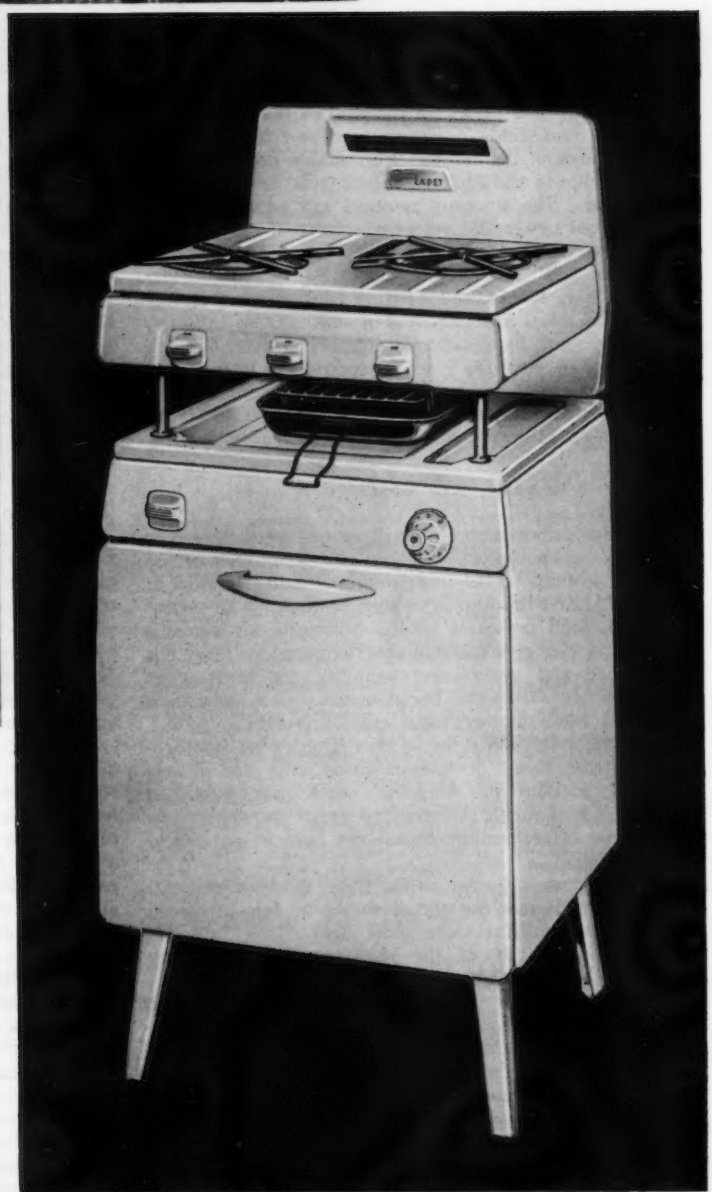

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concept envisages that fuel plus its liquid carrier should circulate through the reactor and also through the heat exchanger. In an alternative concept the fuel is virtually static and a separate liquid or gas is used for transporting heat from the reactor to the heat exchanger. This represents a hybrid concept between the true Stage III systems and the earlier Stage I and Stage II reactors. It is too early to make predictions on which of the very large number of possible systems may ultimately prove to be best. Most is known at present about the so-called homogeneous aqueous reactor system mainly because of the long programme of work which has been carried out in America at the Oak Ridge National Laboratory where an actual system has operated and where a second system is now approaching completion[13].

The homogeneous acqueous reactor looks deceptively simple at first sight, but it has many formidable design problems. First, the uranyl-sulphate solution used in the core of the reactor is highly corrosive and, for good nuclear performance, it has to be kept separate by a very thin neutron transparent window from a surrounding blanket of a slurry of thoria in pressurised heavy water. Fresh uranium 233 is formed in this blanket. Very little is known at present on the mechanism of maintaining the slurry in a reasonably uniform stage and in preventing deposition around the circuit. Formidable problems arise from the intense radioactivity which will be in solution in the water. The amounts involved will be of the order of millions of curies and yet even a curie of radioactivity can be extremely troublesome. Clearly, a very high standard of leak tightness will be called for. A further point which is emphasised by this consideration is that maintenance of the whole system will almost certainly have to be done by remote control. The Westinghouse organisation in America is giving particular attention to this question and is building elaborate equipment in order to test out the economic and engineering feasibility of maintenance and operation.

Too Early to Judge

Much less is known about homogeneous types of reactor systems based on the use of liquid metals[14]. One of the preferred systems is to use solutions and slurries of uranium 233 and thorium in molten bismuth. The system avoids the high pressures of the homogeneous aqueous reactor, and can give much higher temperature heat, but maintenance and general serviceability are at least as great a problem with the liquid metal system as with a pressurised water homogeneous reactor system.

Very little has been done in this country on homogeneous systems based on use of fused salts but a very interesting account of American work was published recently[15]. It is much too early to judge the application of this type of technology to a large land based central power station.

Extremely little is known so far about fluidised concepts of homogeneous reactors and it would be fair to record that one is waiting for some good ideas.

Partly as a result of the realisation of the many difficulties and the long period required for the development of our so-called Stage III reactor systems, attention has been given to the possibility of raising the temperature of operation of our Calder Hall type reactors, and in this way of securing a marked reduction in capital costs. The use of beryllium canning has been studied and work is proceeding on developing ways and means of reducing the reaction betwen carbon dioxide and graphite at the higher temperatures which will be involved. However, something much more drastic will be needed if really high temperatures are to be achieved, approaching 1,000°C., and, with this in mind, studies have been made of gas-cooled reactors in which much more intimate mixing of fuel and moderator occurs. One concept of this envisages a ceramic uncanned fuel in close association with a moderator. By these means an entirely new field of study is opened up which will avoid many of the complex corrosion problems of the liquid homogeneous system. Furthermore, some fraction of the fission products which would otherwise be in solution in the system can be contained within the solid reactor fuel; though it would be unwise to hope for too much in this direction. One is faced therefore with a highly radioactive gaseous circuit. It is much too early to obtain any very clear view of the potentialities of this particular system but the recent annual report of the Authority indicates that high priority is being given to a study.

Restricted Choice

A medium output land based power station may be defined as one with a capacity around 30,000 electrical kilowatts. It should have a use in non-industrialised areas, in small, remote mining communities and in other remote localities. Such reactor systems will not be connected to a national distribution network and therefore a high degree of reliability will be called for. Furthermore, the design must be such that maintenance is not highly skilled and is kept to a minimum. This would appear to rule out entirely, for many years to come, the use of any Stage III technology, and one is likely therefore to be restricted to a very small number of possible reactor types. Sodium cooling does not seem very likely for this type of power station for operational reasons. Furthermore, in a water reactor extreme leak tightness may prove expensive. Consequently, it may be tolerable to accept heavy water as the moderator but it is not likely that one could accept it as a coolant under high pressure. One must conclude, therefore, that the choice is restricted, probably, to a small Calder Hall reactor, a heavy water reactor cooled by gas[16], a small pressurised water reactor[17] and the organic liquid moderator and cooled reactor.[18] It is not easy to see any other system which is likely to compete in the next ten years.

In the pressurised water or the organic liquid reactor, it will be necessary to use either a highly enriched fuel based on uranium 235 from a diffusion plant or plutonium obtained from a large civil power station. A medium size, pressurised water reactor is giving extremely satisfactory performance in the American submarine Nautilus. A small organic moderator reactor has been constructed for purely experimental purposes in the United States and will go into operation some time later this year. One of the great uncertainties with this type of system is the behaviour of the organic liquid under the influence of strong irradiation in a reactor. Enough is known however to be certain that such liquids can be used, though the cost of replacing the liquid at frequent intervals may represent a significant addition to the cost of power from such reactors. However, developments are proceeding rapidly and it would be rash to predict more than a short period ahead. A gas-cooled heavy water reactor is being studied in the U.K., America, Russia, France, Sweden, Canada and possibly elsewhere, but no firm view has been taken on it yet. One of its attractions is that it should be possible to use natural uranium or only a slightly enriched fuel for very modest power outputs of 30,000 kilowatts or even less. The recent annual report of our Authority indicates that studies are proceeding on a scaled-down Calder Hall type of reactor for a power output of 30,000 kilowatts.

There is a requirement for reactors with a low power output of one to two thousand kilowatts for use in very remote places where, for example, conventional fuels may have to be brought in by air. In these conditions, there is little doubt that it may be possible to make an economic

system, but there would appear to be only two possibilities at present. Either a small pressurised water system or a small organic liquid system can be considered. In the immediate future one is restricted to a small pressurised water system. There will almost certainly be an economic use for the reject heat for the comfort heating of buildings in the community around a very low output reactor.

Individual Central Heating

Consideration has been given recently to the possibility of using reactors either for supplying central heating for large buildings or for supplying heat for industrial processes. In the former case, there is a severe disadvantage, in this country, in that the load factor for the central heating of buildings is low. It is therefore to be expected that, in the first instance, the direct use of reactor heat will be for industrial purposes, and study is proceeding to determine processes which could benefit from the very cheap heat which nuclear power will make possible. Cheapness will depend on having a very large installation that needs the equivalent of a few hundreds of thousands of kilowatts of electrical heat. There would appear to be no reasonable economic possibility at the moment of supplying heat in comparatively small amounts for individual buildings for comfort purposes or for supplying small quantities of heat for industrial processing. Furthermore, coolant exit temperatures are not likely to exceed 1,000°F. in a commercially operating system during the next ten to 15 years.

A considerable amount of interest is being shown at the present time in building reactors in which the irradiation of materials in the reactor is directly responsible for chemical reactions or physical changes in a solid. For example tyres have been vulcanised. It is, however, much too early to assess likely developments.

The recently published McKinney report[19] prepared for the United States Congressional Joint Committee on Atomic Energy is quite illuminating on the subject of the application of nuclear power for transportation. It suggests that it is not possible within the next 20 years to foresee any appreciable use of nuclear power for either land or air transport, except in so far as electricity is generated in central power stations, for use in a purely conventional way for transportation purposes.

Similar Problem for Ships

Marine transportation looks more promising and the U.S. Navy has constructed a nuclear-powered submarine with outstanding characteristics. It can proceed under water for as long as the crew can endure it at speeds of the order of 20 knots and requires refuelling at only very infrequent intervals—of the order of a year or more. As a result, the U.S. Navy regards the nuclear propulsion of warships and submarines as a matter of greatest importance. However it will not be easy to secure an economic merchant ship except for large vessels. The power required for a 50,000-ton tanker is only of the order of 20,000 shaft horse power or about 15,000 kilowatts of electricity. It can be seen that, even for quite large ships, the problem is similar to that of the medium output land-based type of nuclear power station. Nevertheless, it looks as though it is just about economic at present prices to consider building a large tanker or a large ore-carrier based on nuclear power. However, it would be wrong to assume that a very rapid changeover to nuclear propulsion will occur. For one thing, a reactor system for a merchant ship must be extremely reliable and must be well proven before it is adopted on a wide scale.

The problem for a smaller ship of 10,000 tons or less is that a reactor system will require perhaps a total electrical output of some 5,000 kilowatts or even less. It will be some time before a reasonably economical reactor system can be competitive with a conventionally fuelled propulsion system in this range.

In conclusion, it must be emphasised that only two technologies have been developed in any detail, namely the gas-cooled, graphite moderated technology of Calder Hall in England and the pressurised water technology as developed for submarine propulsion in the United States. The latter is now being adapted for land-based use. These two projects have involved large number of staff for many years and it would be wrong to assume that some of the more complicated systems could be developed as easily. In fact they will require more effort for a longer time. Furthermore, they will have to be brought into use at a time when there is a very wide experience of already developed systems. Therefore, they will have to be developed to a higher state of perfection before they will be accepted into our national system. It would be very wrong to believe that a large number of different types of reactor systems will be fully developed in the next 20 years; this in itself stresses the great importance of selecting a few of the most promising systems at an early date and then, as far as possible, concentrating one's resources on them.

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Continued from p. 618.

of a switch in the driver's cabin. Should the driver be attempting to lift a load which is likely to become outside the safety margins of his crane, a light will show on the dashboard in his cabin. If this is disregarded an audible warning follows and should the driver continue to attempt the lift, the crane pulls up and the lifting operation is stopped automatically.

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These cranes are fitted with automatic reversing steering mechanism, by means of which the steering is unaffected by the differences of relative position between the four-wheeled chassis and the revolving crane unit when slewing. In this way the rear wheels may suddenly become the steering wheels without the crane driver having to remember which way he is facing and in which direction he must turn his steering wheel.

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(*Classified advertisements continued on page* 630)

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A VACANCY exists for the post of SUPERINTENDENT of the Industrial Development Centre at Derby.

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The Superintendent will be responsible to the Divisional Industrial Gas Engineer for the work of the Centre.

The commencing salary will be within Grade A.P.T. 10 (£860/£960) of the National Salary Scales according to qualifications and experience.

The position is pensionable and the successful applicant will be required to pass a medical examination.

Applications stating age and giving details of education, qualifications and experience, together with the names of two referees, should be addressed to the undersigned not later than October 14, 1957.

K. L. PEARCE,
Divisional General Manager.

East Midlands Gas Board,
Notts. and Derby Division,
P.O. Box No. 62,
Friar Gate,
Derby.

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WREXHAM UNDERTAKING
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Applicants should be experienced in High/Low pressure Gas Distribution Practice, including main-laying and planning, also in controlling labour and the supervision of work being carried out by Contractors.

The position is pensionable. The successful applicant may be required to pass a medical examination.

Applications stating age, experience, qualifications and particulars of training, together with the names of two referees, should be received by the undersigned not later than September 30, 1957.

J. F. LLOYD,
Engineer and Manager.

Gas Offices,
23, Salop Road,
Wrexham.

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WARWICKSHIRE DIVISION
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APPLICATIONS are invited for the above appointments from candidates conversant with gasworks routine tests and preferably having experience of continuous vertical retorts and carburetted water gas plants.

Candidates should be Associate Members of the Institution of Gas Engineers, possess an equivalent qualification, or be studying for same.

The salary for the posts will be in accordance with A.P.T. Grades 6/7 of the National Salary Scales for Gas Staffs. (£640—£785 per annum.)

The posts are pensionable and the successful candidates may be required to pass medical examinations.

Applications, stating age, qualifications and experience, should be addressed to A. Allen, Esq., Divisional General Manager, West Midlands Gas Board, Gas Street, Coventry, to reach him by not later than October 1, 1957.

J. SWAN,
Secretary to the Board.

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Applications, stating age, qualifications and experience, should be addressed to Mr. J. E. Stanier, Divisional General Manager, West Midlands Gas Board, Etruscan Street, Etruria, Stoke-on-Trent, to reach him not later than September 30, 1957.

J. SWAN,
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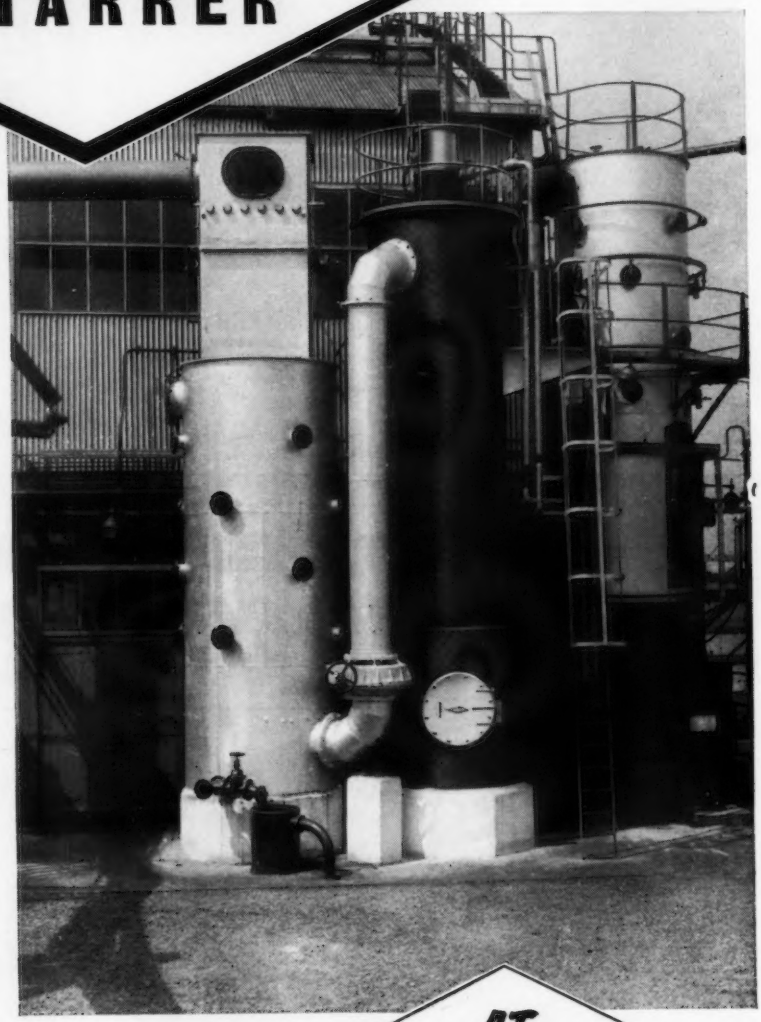

This Detarrer, installed to the order of Messrs. Humphreys & Glasgow Ltd., was commissioned in 1954. It represents the first application of electrical precipitation to the Onia-Gegi cyclic gas making process in the U.K.

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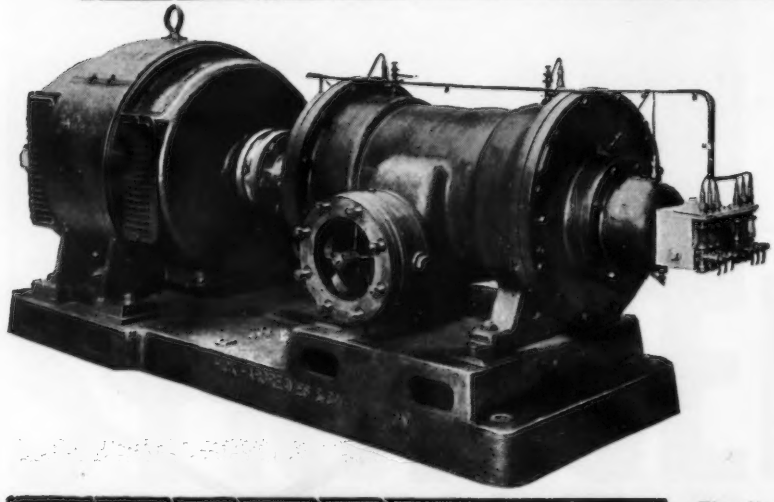

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The illustration shows an air-cooled Compressor for 15 p.s.i.g. Also available as a water-cooled machine for h.p. distribution.

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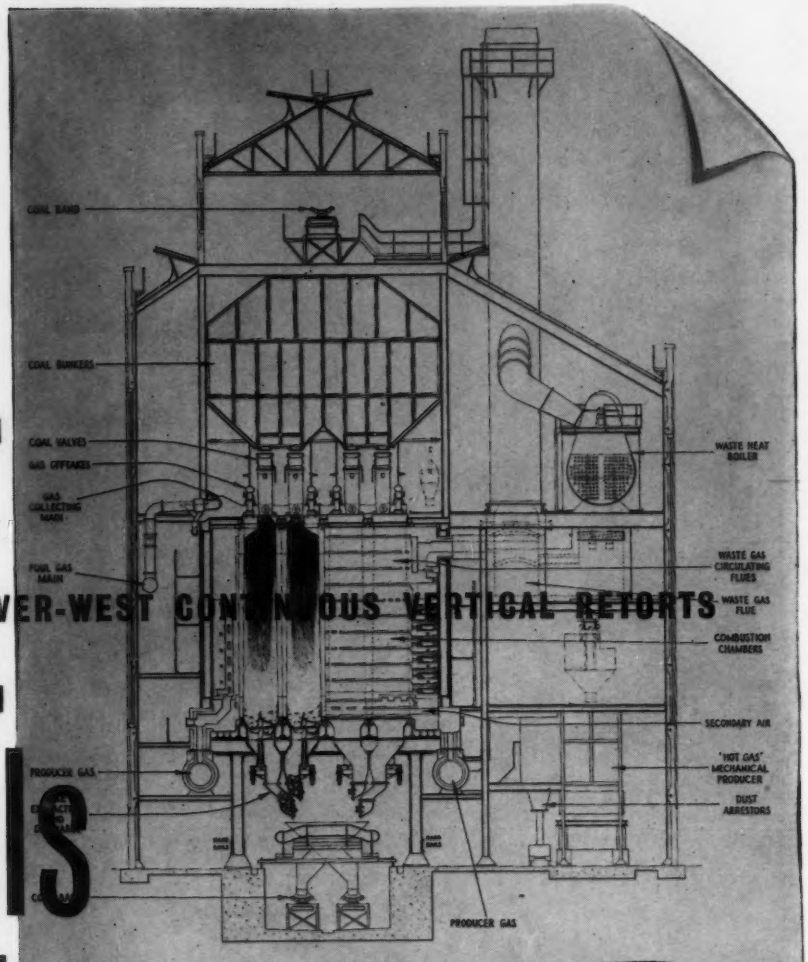

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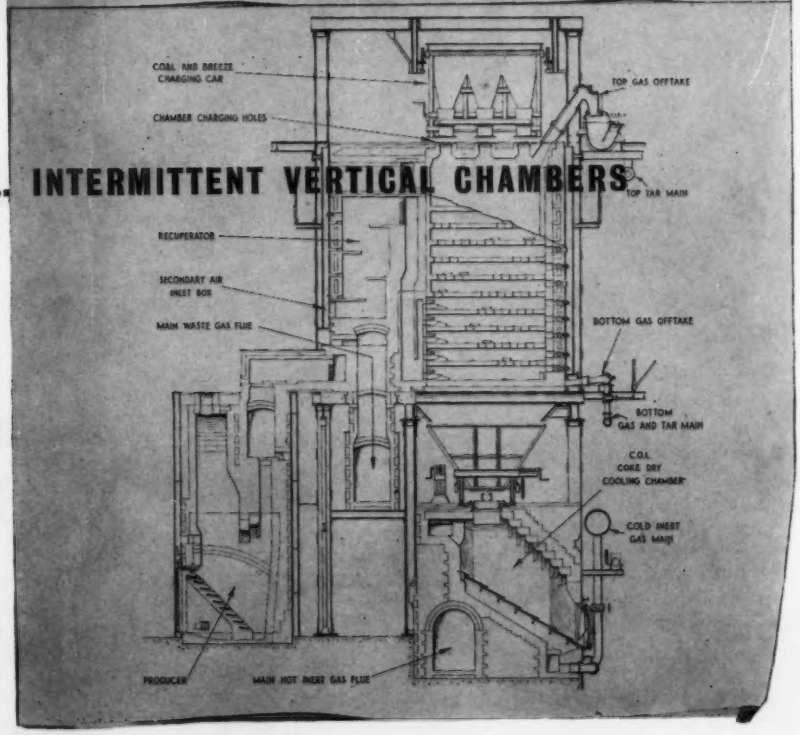

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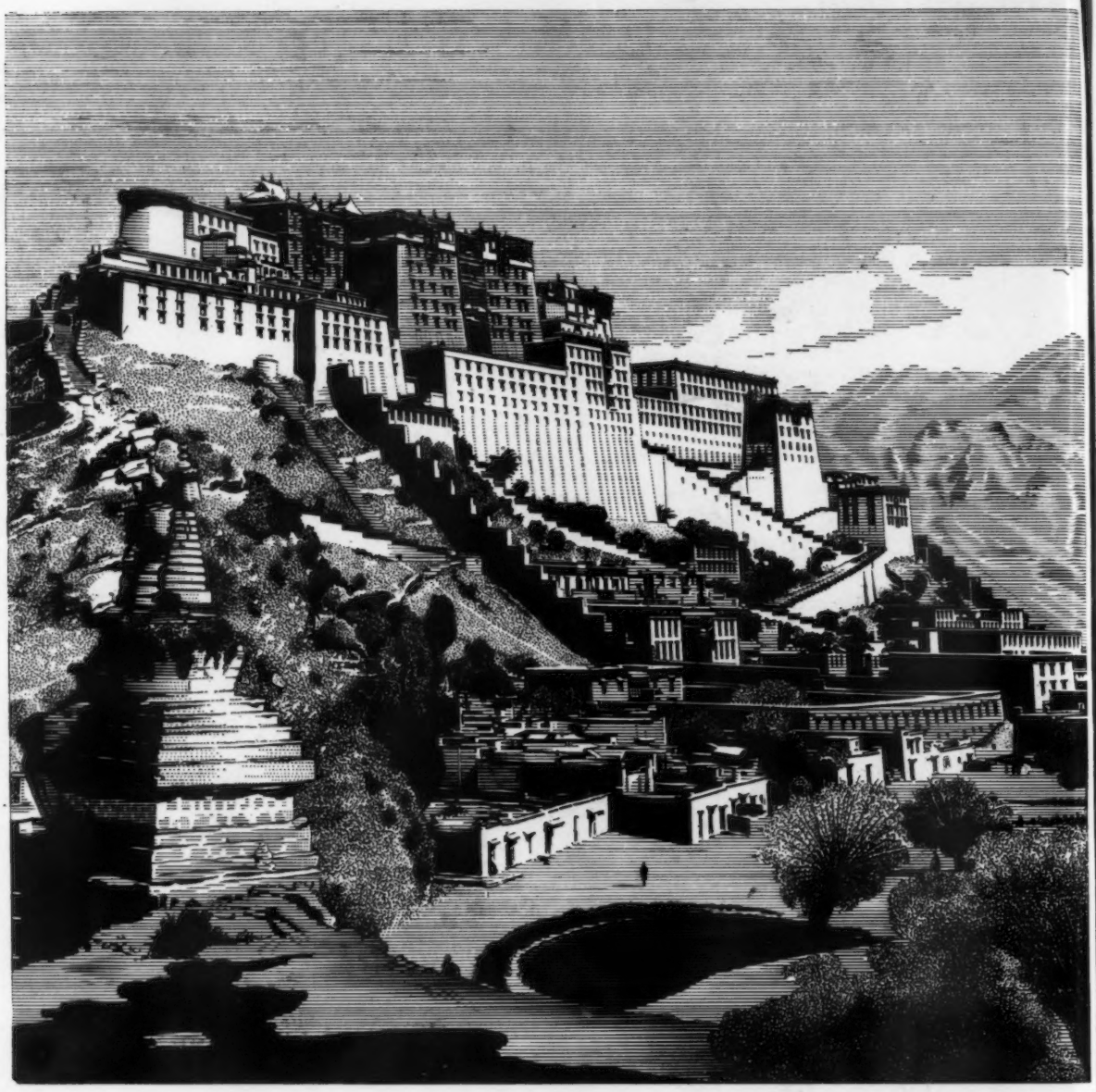

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